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FOOD INDUSTRIES

NATIONAL EDITION

MAY 14 1948

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

High speed machine fully processes potato chips

MAY 1948

ION EXCHANGE FINDS NEW USES

Gas Packaging Of Peanuts

Refrigeration In the Dairy Plant

Air Conditioning In a Pie Bakery

Locker Plants Reach Out

Graded Pads for Depth Filtration

Continuous Tray Enzyme Production

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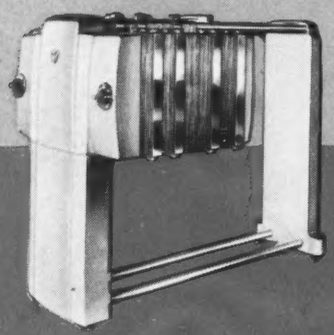

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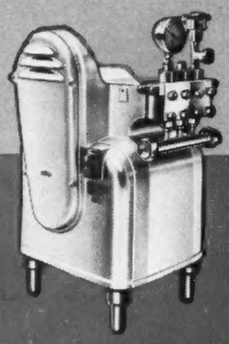

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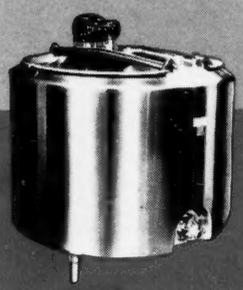

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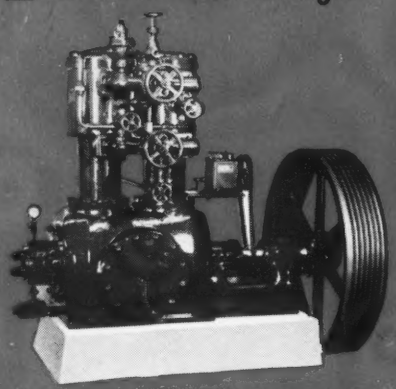

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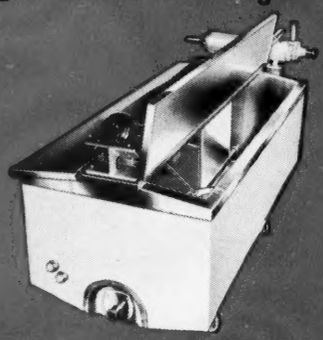

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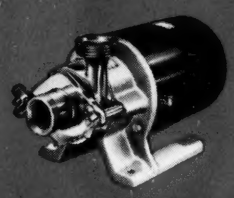

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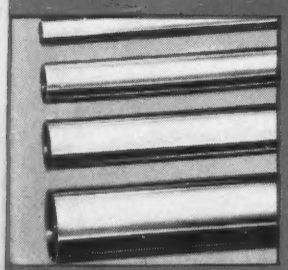

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FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

MAY, 1948 Volume 20, Number 5

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THE COVER

ONE ATTENDANT controls the complete operation on this Ferry automatic potato chip machine at Clover Club Foods Co., Kaysville, Utah. Two machines installed there have capacities of 375 and 250 lb. of chips per hour, respectively. A sample is here being pulled for Clover's president, N. V. Sanders.

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Only a Prosperous America Can Be Free

DURING May 50 million American workers will get from the Congress of the United States a real incentive to work.

This incentive is called a tax cut. Beginning May 1, the withholding tax on incomes will be reduced, giving everyone a much-needed increase in take-home pay.

But the tax cut will have a far more important effect. It may be literally a life-saver for American employment and production—and, hence, for the stability of the world. It will help to do two things which must be done if our economy is to continue to furnish good jobs and good earnings.

1. *It will generate part of the private funds for investment in common stocks—the "risk capital" which we need to sustain prosperity.*
2. *It will provide part of the incentives necessary to make American business management still more effective.*

These two predictions are not advanced as matters of opinion. They are based on facts reported by McGraw-Hill field editors.

These facts show why the reductions in upper bracket income tax rates are most significant for our continued prosperity. For the first time in more than twenty years the tax burden on people who can afford to risk their savings has been lightened. To find out what this will mean to the economy, McGraw-Hill field editors all over the nation asked a group of business executives making $15,000 a year or more how they will use the money which the tax cut gives them. Here is what they said:

1. They plan to save—not spend—three-fourths of the money they keep as a result of tax reduction.
2. They plan to invest one-half of these savings in common stocks. If all persons making over $15,000 follow this pattern, they will make available about a half billion dollars of risk capital for American industry.

WHAT THE TAX CUT WILL DO

What will upper bracket taxpayers do with their tax savings?
What can business expect as a result?

TO ANSWER THESE QUESTIONS, McGraw-Hill field editors interviewed a carefully selected sample of business executives earning $15,000 a year or more. Here, for the first time, are solid facts that show how tax reduction will effect the supply of risk capital and business incentives. These are the results:

1) How much of your tax reduction will you save? 74%
2) How much of your tax savings will you invest in common stocks? 52%
3) Will lower taxes lead you to switch some of your investment in bonds to stocks? Yes 28%
4) Have you passed up an opportunity to invest in a new business in the last five years because the return after taxes did not justify the risk? Yes 40%
5) Will lower taxes make you more inclined to take a risk on a new business? Yes 80%
6) Have you turned down the opportunity to take a bigger job in the last five years because taxes would take too much of the additional income offered? Yes 13%
7) Do you know of actual cases of executives who have turned down bigger jobs or more work because of taxes? Yes 38%
8) Will lower taxes make you more inclined to take on a bigger job or more work? Yes 59%

3. They also will switch some of their present savings from bonds and bank accounts to common stocks. This might easily add a billion dollars or more to the supply of risk capital.

The one-half billion dollars of tax savings and the funds switched from other investments into common stocks is not enough to end the shortage of risk capital. But it is a start.

Before passage of the tax law, risk capital had been growing increasingly scarce.

One measure of the scarcity is that last year only four-tenths of 1% of national income went into new common stocks. In 1925, a year of normal prosperity, almost 3% of national income was invested in new common stocks.

Another measure is that between 1940 and 1947 people actually reduced their holdings of corporate stocks and bonds by nearly a billion dollars. During the same period, people salted away almost $150 billion in such safe havens as cash, bank deposits, and government bonds.

This drought of risk capital hit us just when we need a vastly increased flow of risk capital to finance the expansion and improvement of our American productive machine. We need risk capital to search for new oil fields and to build new pipelines and refineries. We need capital to expand our over-loaded electric and gas utilities. We need it to finish re-equipping our airlines and railroads and bus lines. We need it to modernize our textile production. We need it to keep pace in the magical, booming chemical industries. We need it to launch the new industry of television.

We need capital for all this work and for much more besides. And we must do all this work if we are to keep the United States dynamic and if we are to create new and better jobs.

The tax cut comes just in time. As the last editorial in this series showed, the flow of risk capital must double or triple if we are to avoid a cutback in industrial expansion next year. A major reduction in industrial expansion because of a shortage of risk capital would menace our prosperity. Whenever capital expansion has sagged, the whole economy has sagged. That is the record. That is why every American has a crucial interest in breaking the shortage of risk capital.

The tax reduction now going into effect helps relieve that shortage. In my opinion, we need still other tax changes to assure enough risk capital for healthy industry and healthy employment.

We should encourage the rapid depreciation and replacement of plants and equipment to keep America efficient.

We should eliminate the double taxation of stockholders' incomes.

We should permit full averaging of good years and bad in calculating income tax payments.

We should cut tax rates again as soon as we can.

The tax cut of 1948 will prime the flow of capital. We must keep it flowing.

The tax cut also encourages our successful men and women to work harder and more effectively.

The McGraw-Hill editors collected some solid facts to show how seriously heavy taxes have discouraged business leaders. Here they are:

1. One out of seven persons the editors questioned said that they had turned down positions with greater responsibilities because heavy taxes would take most of the greater pay that went with the harder job.

2. Six out of ten executives would be more inclined to accept a more responsible job now that taxes will let them keep more of the added pay such a job would bring.

We all have a stake in incentives which make men work harder, especially talented men. The more we each work, the more we all have.

The tax reductions so far made will leave the government more than enough revenue to meet all its expenses, including the proposed defense expenses, and still reduce the national debt. If more defense money becomes necessary, vigorous economy on less essential government expenses will make possible both stronger military defenses and a better tax system. We need both.

Only a prosperous America can be strong enough to remain free—and to help keep the rest of the world free.

President, McGraw-Hill Publishing Company, Inc.

Freezing Pains and Palliatives

AGAIN the frozen fruits and vegetables industry has gone through the wringer. Increased wartime capacity and a ready market resulted in over-production in 1946. Worse, quality was lost sight of by some new and inexperienced packers and overanxious distributors. Inventories accumulated in the warehouses and quality gradually deteriorated, especially when uniform zero degree temperatures were not maintained. Temperatures in transit too often were not properly controlled, and retail cabinets sometimes were much too warm. And to top it all off, many housewives have not understood how best to store and prepare frozen foods, nor were the retailers able or willing to tell them. It has all added up to financial embarrassment for some of the less fortunate in the frozen food industry.

Big Job Ahead of Industry

The outlook, however, is by no means bleak. The inventory situation has greatly improved, thanks largely to an estimated pack of 700,000,000 lb. in 1947 as compared to the 1946 production of 900,000,000 lb. But if the troubles of the past year and a half are to be overcome, the industry has a big job of self-improvement and promotion ahead. No one knows this better than the leaders in the field. If any industry ever did a constructive job of pointing up its own shortcomings, the frozen food packers did at their convention in Chicago. This was an excellent demonstration of right thinking on the part of the National Association of Frozen Packers and National Wholesale Frozen Food Distributors.

Where Were the Packers?

The one discouraging note at the convention was the widespread lack of serious interest on the part of the individual packers. At a highly important technical session there were 61 in attendance. Some of the speakers were "impressed" by the smallness of their audience. Lack of interest also was displayed at the exposition. As one exhibitor expressed it: "If I aimed a shotgun down this aisle and pulled the trigger, the shot wouldn't strike a single frozen food packer."

Can it be that some of the packers are like the farmer who refused to buy a book that would help him do a better job of farming. "Shucks," he said, "I don't farm half as well now as I know how."

We urge each and every packer to take to heart the vital part he plays in bringing to fruition the tremendous potential of the frozen food industry. In an industry that is selling a quality line, such as frozen foods, one producer of off-quality products gives all of his associates a black eye—just like the one rotten apple in the barrel.

Progressive Steps Taken

Several constructive moves are under way in the frozen food industry. Among these are the proposed Food and Drug Administration standards. Instead of taking the attitude that government standards represent bureaucratic infringement upon the rights of the individual, packers should welcome their stabilizing influence. Standards put a floor under industry performance, and such a base will be of real value to the entire industry.

But standards are only a part of the better things in store. An industry-wide informative labeling campaign is under way. And if the testimony of distributors and home economists is any criterion, informative labeling is badly needed. When the housewife buys a package of frozen foods, the label should tell her exactly what the product is, how many people it will serve, how the product should be stored, how long it can be kept after thawing, and how it should be prepared. Labels which don't come loose also are wanted by distributors. And one authority suggests that an indicator which shows whether the product has thawed before reaching the housewife would be a boon to the industry. This is not labeling, but it certainly would be informative.

Also on the credit side in the future is a consumer education campaign that is to be intensified. Recent developments in this program include establishment of a test kitchen, issuance of periodical newsletters and an information service to cooking editors of newspapers and women broadcasters.

Technical Assistance

More important, a laboratory for technological investigation has been set up in Washington. A consultation service for packers has been established and research work undertaken to provide methods for constant improvement of frozen products.

Finally, an answer to better shipping facilities for frozen foods may have been found in the "split absorption" refrigerator car, which uses ammonia instead of ice and will keep frozen foods at proper temperatures in transit.

Yes, there is real progress on the way in frozen foods. But none of these progressive steps can pay off unless all packers carefully watch the quality of their products.

F K Lawler

EXECUTIVE EDITOR

The Talk of the Industry

TO READERS AND ADVERTISERS

Unsettled relations between printers with whom we deal and certain of their employees have forced us to use some substitute methods in producing this issue, as we did in April. The results of these deviations from normal may be visible to you. If the printing emergency persists, we may have to resort to still more apparent substitutes. But we intend to let nothing which we can now foresee stop us from bringing to you full-length, clear, and typographically pleasing issues.

●THE government is campaigning for pest control as a means of saving wheat, corn, and other grains normally destroyed by pests in great quantities after harvesting. They have adopted the slogan, "Feed People—Not Rats." Fortunately each unit of the food business which has anything to do with grain or cereal products can profit by use of the latest and best of the pest controls for rats and insects. So it will pay to be patriotic and follow the slogan.

●How much profit did you make last year? If you did better than 3.5 percent per dollar sales, you did well. That is the average for 89 companies surveyed by Grocery Manufacturers of America. In 1946, the profit was 3.9 percent; in 1939, 4.6 percent. Obviously, higher costs have not been passed entirely to the consumer.

● A SPEAKER before a textile group, the National Association of Shirt and Pajama Manufacturers, recently made quite a point about the competition of food with textiles. The high cost of living, he said, was making it impossible for many families to buy their needs for shirts and pajamas.

● ALTHOUGH there are different opinions regarding the effect of the strike in some of the big meat packer's plants, it has not been a wholly unmitigated evil to the packers. The commodity slump caught some of the smaller packers and big meat wholesalers with large high-cost inventories. Some of them feared they were about to take a real shellacking. The merchantable life of dressed meats is short: beef about four to five weeks unless buyers are willing to pay for huge trimming losses after aging: pork about two weeks.

The strike lasted long enough to permit the inventories to be worked off, and the AFL-operated plants kept up a supply big enough that consumer prices did not get out of hand.

But holding back farm animals after they were ready for the market has caused the disappearance of a lot of much-needed grain.

●A YOUNG lady worker in a freight yard telegraph office on the midnight to morning shift was injured when attacked by a thug at her isolated place of work. She sought damages from the railroad. Finally the U. S. Supreme Court ruled that the employer was liable because he reasonably should have anticipated the danger, and was negligent in not providing for protection of a woman employee in such an isolated place. Food plant executives may not have many isolated employee locations. But they better note with care the basis of the decision. A reasonably foreseeable danger caused by irresponsible or criminal persons may be taken into account and the hazard adequately guarded against by the employer. This substantially widens the area of responsibility of the plant superintendent.

●PROCESSED eggs are not as abundant this year as last. This results not from scarcity but from lack of buyers. And from the way egg buyers have reacted, one can guess an important trend. Here are the official facts: Dried eggs are being produced at 5 percent of the rate a year ago, liquid eggs at 25 percent of the previous year's rate. Frozen egg production is 90 percent of that a year ago. Who said that the frozen food business was not going ahead substantially?

Incidentally, the huge drop in dried eggs undoubtedly was caused by lack of foreign sales resulting from the dollar shortage abroad.

Hors d'Oeuvres

• Producer of "Cugat's Nugats" is sponsoring a contest for lyrics to Xavier Cugat's new tune of the same name. "It is believed in candy trade circles," says a publicity piece, "that this contest will be a trail blazer in opening new marketing and merchandising fields for manufacturers." But not for song writers, we hope.

• *War Assets, last month, offered for sale "large quantities of surplus, miscellaneous food products, ranging from maple flavoring to sour pickles." Evidently they couldn't quite make the range from soup to nuts.*

○ U. of Illinois has nine men among 206 non-major students in the Home Economic Department. Bet they aren't nine old men, either.

• *Want to come out on our limb? In February, we said that F&DA had banned plum pudding labels because there were no plums in the pudding. F&DA says there were no plums in that statement, either. You can keep on labeling it "Plum Pudding" because the label isn't fooling anybody. Now, if we can get this department foolproofed, we can ease back off this limb.*

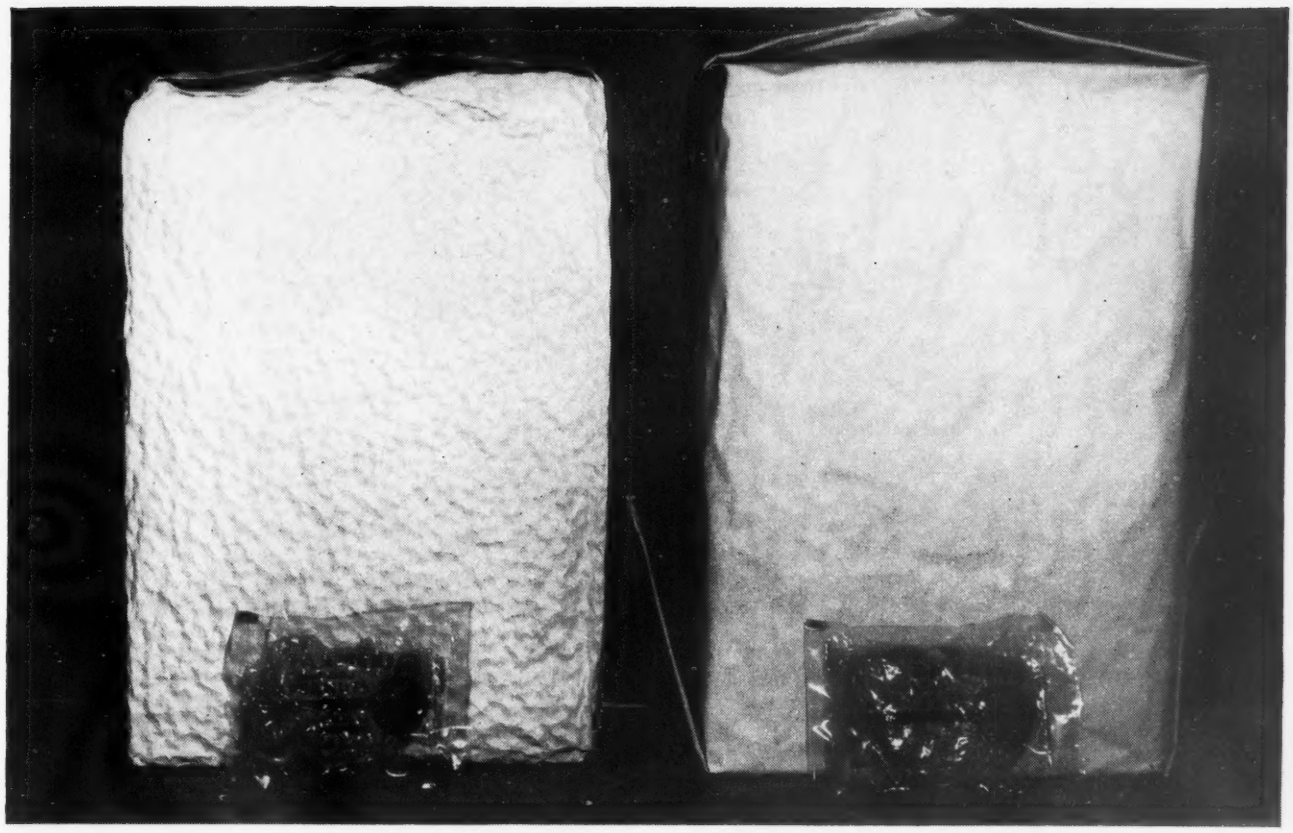
• In a six months experiment, two groups of children were given daily doses of glutamic acid, a beet sugar byproduct, at Columbia University. One result—the average I. Q. of the group is said to have been increased. Such close contact with Columbia could have had something to do with it, you know.

• *Needn't worry about the children swallowing pins any more, according to National Dairy Council. At St. Joe hospital in Elgin, Ill., they top such diets with small balls of cotton covered with ice cream, a dish every two hours. For non-pinfeeders, just plain ice cream is still O. K. with NDC.*

• Australia also claims to be exchanging delicacies with us. They are shipping us frozen foods, tons of scallops, and cherries. In return, they say, the Donut Corp. is cooperating, Down Under, in the making of donuts. This isn't much to go on but it looks mighty like a hoss trade.

• *So GE comes along with a display refrigerator-freezer that talks, rolls its eyes and manipulates its interior. It doesn't go fetch the stuff to put in it, however, which is the angle that would interest us.*

• ACS reports a synthetic hormone, derived from the byproducts of petroleum cracking, that stimulates broadleaf weeds to death. Grasses and cereal grains are stimulated only enough to grow. Not a bad way to die, though. **J.A.J.J.**



FLEXIBLE packages are used for the first time to vacuum (left) or nitrogen (right) pack salted peanuts so as to maintain freshness of the nuts from plant to consumer. Bags are designed for vacuum and gas packing and then heat sealing.

New Gas Packaging Method Retains Quality of Peanuts

"Flex-Vac" prolongs shelf-life of roasted, salted peanuts. Salt and cooking oil adhere to the nuts and do not accumulate in the bottom of the bag

By JOHN V. ZIEMBA,
Assistant Editor, "Food Industries"

A NEW method of gas packaging promises to overcome consumer resistance to salted peanuts that are sold or repackaged by chain stores, wholesalers and jobbers. With this new method, roaster-cooker freshness of the peanuts is maintained from plant to consumer. Freshness is assured regardless of shipping distance and the length of time between processing and consumption.

Credit for this new development goes to Farmers Nut Corp., Suffolk, Va. and Flex-Vac Div., Standard Cap & Seal Corp., New York. P. R. Van Valkenburg and E. W. Elmore, Farmers Nut Corp., approached Standard Cap & Seal officials two years ago with the idea of bulk packaging salted peanuts in a flexible package under vacuum or with the inert gas, nitrogen. Salted peanut production of thousands of pounds a day is now thus safeguarded at the Farmers plant.

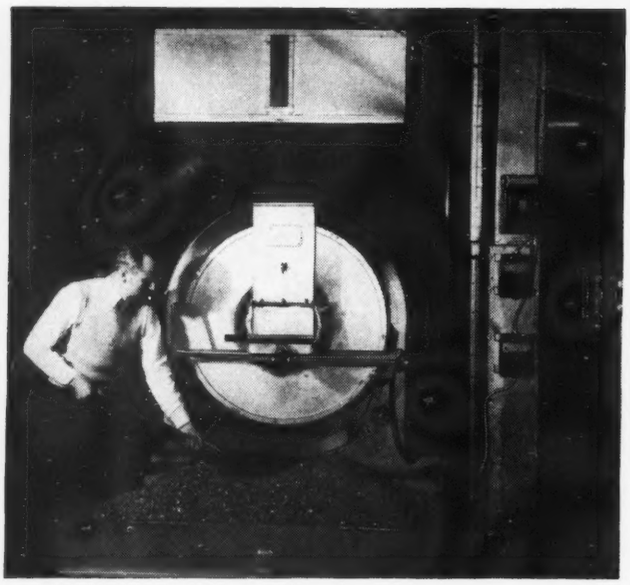
Reason for the new package was the decline in sales. The consumer no longer would accept poor quality nuts. The peanut industry soon recognized that the package being used did not offer the peanuts adequate protection. When packaged in usual waxed paper bag or liner and a corrugated carton, the nuts became stale, rancid or soggy within a short time.

The Standard Cap & Seal Corp. arrived at a method of keeping the nuts as fresh as when they left the cooker. It took their engineers about two years to develop a suitable laminated bag, called a Flex-Vac bag, that could be vacuum- and nitrogen-packed and then heat-sealed.

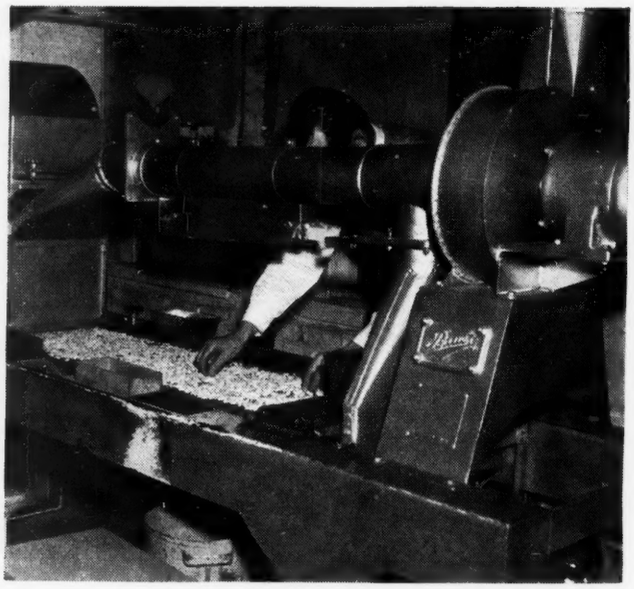
Pilot plant operations at the Farmers Nut Corp. plant in 1947 proved the soundness of the operation.. New processing lines were

The new gas packaging technic is valuable for maintaining the quality of several kinds of food products packed in flexible bags. Fresh, sliced bacon, vacuum-packed in a Cellophane-Pliofilm bag, is now being market tested by Armour & Co. Development work is under way to apply the technic to frankfurters, natural cheese, coffee and frozen fish.—The Editors.

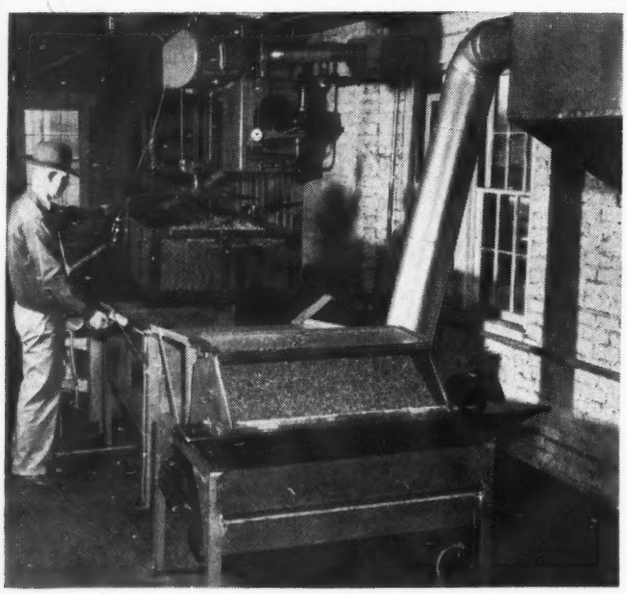
Skins Are Removed Before Blanched Peanuts are Cooked and Salted



ROASTING shelled peanuts to a uniform color in gas-fired ovens. Temperature is instrument controlled.



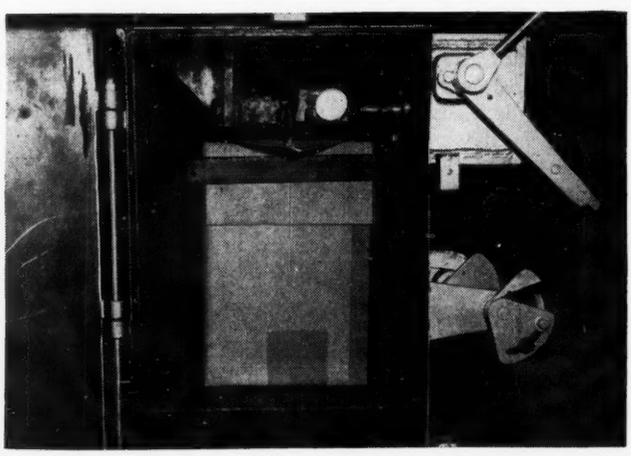
BLANCHING is the next step. Here redskins are removed. Nuts are inspected as they travel over belt conveyor.



COOKING blanched peanuts in oil. Oil is drained and peanuts cooled in a cooling box and mixed with salt.

FORMING the bulk, Flex-Vac bag over a wooden mandrel. A corrugated carton is then placed over the formed bag.

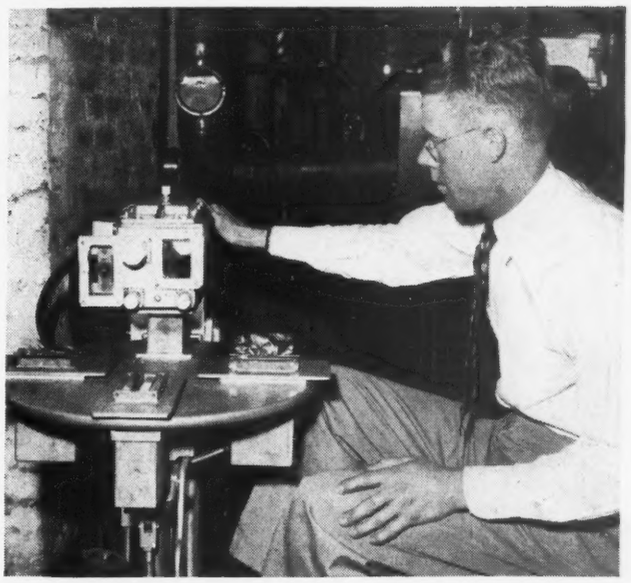
GRAVITY filling the salted peanuts into bulk package. Packages are then weighed to a net weight of 30 lb.



VACUUM chamber (interior view) shows heat-sealing bars and a metal frame holding the carton flaps in position.

Peanuts Are Gas Packed in Bulk and in Retail Test Size Packages

GAS PACKING peanuts in bulk. Vacuum is drawn and nitrogen enters chamber. Bag is then heat-sealed.



TEST unit for vacuum and gas packing retail packages. Production will follow development of high-speed machines.

accordingly designed, with three new features incorporated to further improve the quality of the nuts.

Advantages of New Package

The new package, the first of its kind ever used to bulk package foods, protects the nuts in two ways. First, the package itself offers physical protection because it is moisture-proof, grease-proof, insect-proof and dust-proof. Second, the method of packaging—with vacuum and nitrogen—furnishes protection against chemical change or deterioration.

Since the package is moisture-proof, the nuts are crisp and no longer soggy, regardless of surrounding atmospheric conditions. Also owing to the grease-proofness, oil no longer soaks through the inside bag or liner to the carton itself. In this way the cartons do not lose their strength and become damaged during handling. Neither is rancidity accelerated by the oil-soaked condition of the package.

The bag is made of insect-proof material. Since the bag is heat-sealable, infestation by insects is prevented. Heat sealing also makes the bag dust-proof.

Prevents Change in Quality

Packaging the nuts in an atmosphere of nitrogen prevents changes in the quality of the nuts in several ways. In the first place, the nuts do not oxidize and become stale. Secondly, salt adheres to the nuts instead of accumulating in the bottom of the bag. Finally, the cooking oil remains evenly coated on the peanuts, rather than separating to the bottom of the bag.

Roasting Peanuts

Operations at the Farmers plant follow the conventional in general but differ in several respects. The shelled peanuts are first delivered to the plant in trucks or box cars from nearby peanut shelling and grading plants. At the plant the nuts are dumped from bags into a storage hopper. Peanuts are then delivered by a cup conveyor to the roaster hopper or storage bin for nuts to be cooked in the redskin.

Peanuts that are cooked in the redskin by-pass the roasting and blanching operations. Instead, they are loaded into perforated, heavy gage wire baskets, holding 250 lb. of nuts. An electric hoist on a monorail carries the basket to the cooker.

The peanuts that are not cooked in the redskin are dumped into a Radiant Ray, gas-fired roaster. At this point a 330 lb. batch of peanuts is roasted to a uniform color in about 14 minutes. Instrument controls maintain constant temperatures in the roaster. This assures uniformity in the color of the roast, while the peanuts revolve in a drum.

Roasting accomplishes three things. First, the nuts are given a light roast. Second, some moisture is removed from the nuts so that they are crisp and flavorsome. Finally, the skin becomes brittle so that it can be easily removed during blanching.

After the nuts are roasted, they are dumped into a metal cooling tray with a perforated bottom. The tray is hooked up to an evacuator. The evacuator rapidly cools the hot peanuts to prevent the nuts from cooking in their skins. This cooling takes about eight minutes.

The partly cooled nuts are dumped into storage bins. Each bin holds about 7,000 lb. of nuts. Further cooling of the nuts takes place during the 24 to 48 hr. that the nuts are stored.

Blanching

From the storage bins, the nuts are carried on slotted conveyor belts to blancher hoppers. Skins are removed from the nuts in the blanchers by rubber rollers, rotating in opposite directions. The red skins are then blown into a cyclone. They are then sold to farmers who mix them in poultry feed.

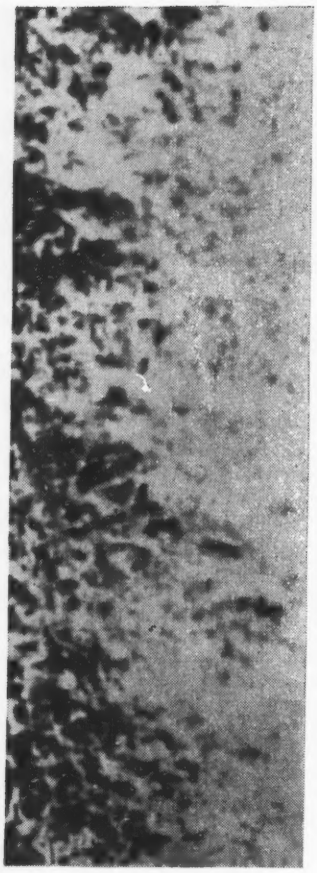
After the skins are removed, the blanched peanuts are dumped on inspection tables. The nuts then travel over a conveyor belt, where girls remove damaged and unblanched peanuts, together with any foreign matter. At the end of the blanching belt, magnets remove foreign metal particles.

Next, the nuts are dumped into a perforated, heavy gage wire basket. The basket is then carried to the cooker by an electric hoist on a monorail.

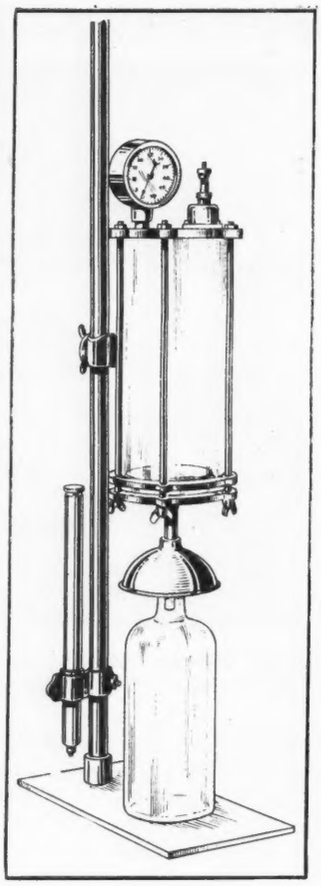
Cooking

Baskets, containing blanched peanuts or peanuts in the redskin, are lowered into the cooker. A special blend of vegetable oils is used to cook the nuts. For 250 lb. of nuts, 75 gal. of oil are used. During cooking the peanuts absorb about 2 gal. of oil per 100 lb. of nuts. Therefore, it is necessary to make up this

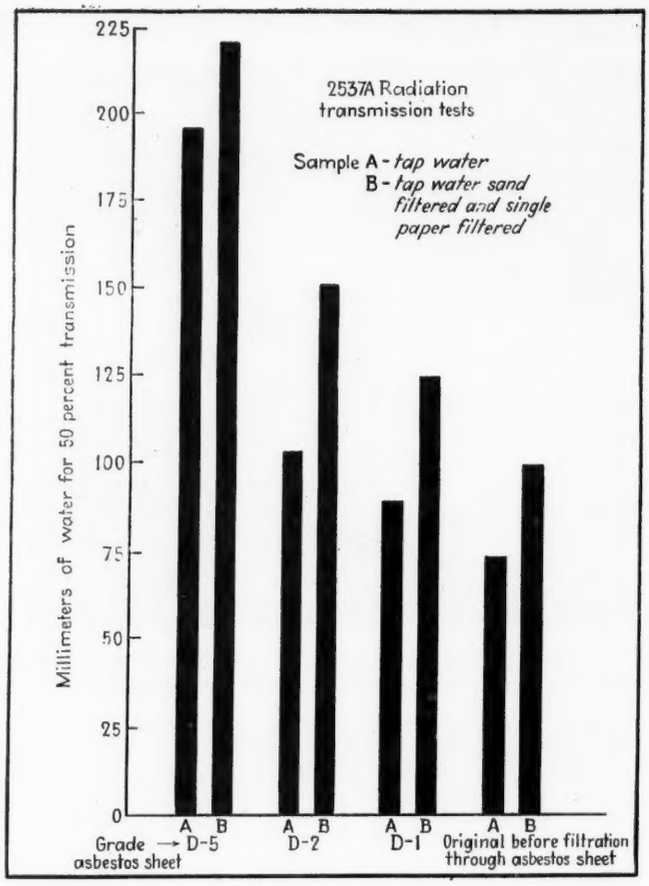
(*Continued on page* 220)



CROSS-SECTION of pad shows particle retention.



LABORATORY filter is used for testing sample pads.



FINE filtration, provided by the use of asbestos filter pads, increases the capacity of the ultra-violet germicidal unit.

Using Graded Porosity Pads For "Depth" Filtration

New filtering technic is used in beverage industries to polish liquids, to improve ultra-violet sterilization and the retention of carbonation

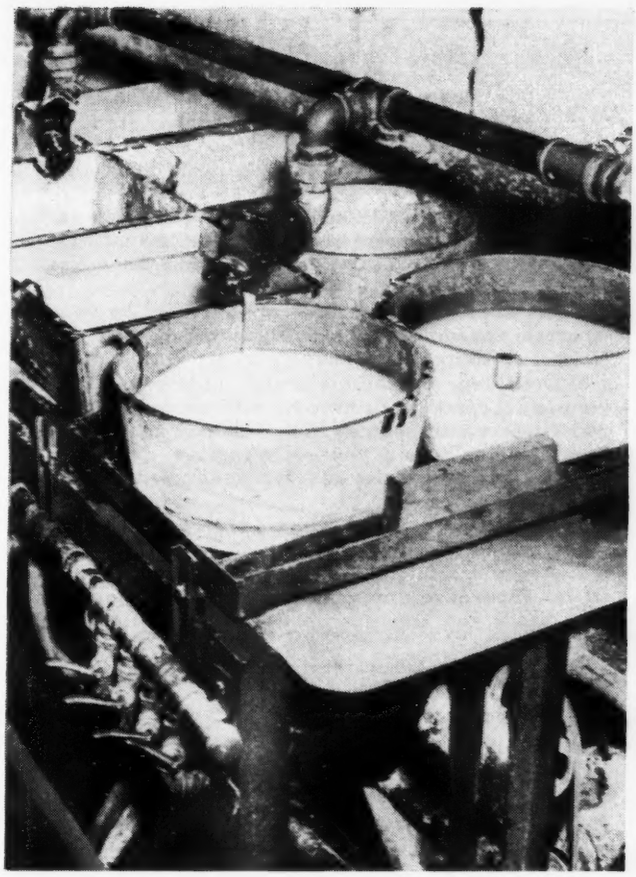
By F. R. HORMANN, President, F. R. Hormann & Co., Inc., Brooklyn, N. Y.

IMPROVED pad filtration, utilizing the principle of "depth" filtration, is now available for special filtering operations in the beverage and other industries. In the beverage industry, depth filtration is used not only for polishing purposes, but also to improve the efficiency of subsequent operations. Ultra-violet sterilization and carbonation retention are two factors which may be affected by the presence of particulate matter.

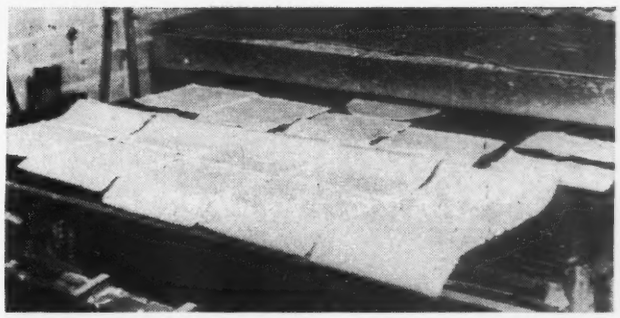
Depth Filtration

Depth filtration is made possible by using asbestos filter pads of gradient porosity. In this way, surface sealing or clogging of the pads is eliminated. Thus, a higher rate of liquid flow is assured, resulting in fewer pad changes and more efficient and economical filtering operations.

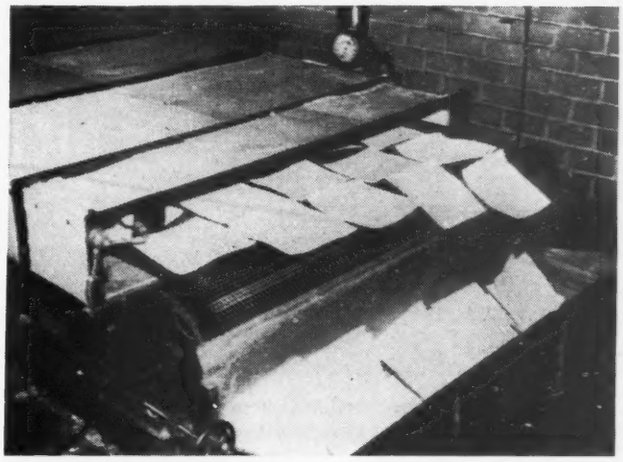
Development of this new filtering technic followed the need for a more efficient method of removing suspended foreign matter from water, wines, flavors, vinegars, beverages and other liquids. Previously, filter presses were equipped with pads of uniform porosity which did not permit adequate depth filtration. Now, these presses have a set of thick filter pads of graded porosity. The first layer of the pad retains the larger particles, and the last layer, the smaller particles. Between these layers, there is a gradation of porosity to prevent clogging of the finer layers.



VACUUM molding to produce pads of gradient porosity. Control of rate of molding under vacuum is necessary.



MOLDED wet pads are transferred to a continuous belt drier, where excess moisture is removed from the pads.



DRIED pads leaving discharge end of drier. Drying is controlled to prevent retention of too much moisture by pads.

Filtration in depth is illustrated in the photomicrograph, which is a cross section of an asbestos filter pad used to filter water in a beverage plant. It shows how particles are retained in progressively less amounts throughout the depth of the pad.

Filter presses, equipped with asbestos pads, have now become standard, wherever the clarity of a liquid is important. This method of filtration is used to remove microorganisms or particles of micronic size, which are likely to cause spoilage or detract from the appearance of liquid products.

Ultra-Violet Sterilization

Effective filtration is particularly important where the water is subsequently sterilized by ultra-violet radiation. With a given wave length of radiant energy, the efficiency of sterilization is dependent upon two factors: (1) Intensity and (2) exposure time of the effective energy.

Matter suspended in a liquid tends to shield bacteria and lower the rate of their destruction. Thus, the clarity of water is a relative measure of the efficiency of this method of sterilization.

The chart, for example, indicates the depth of various samples of water which provides effective transmission of 50 percent of the radiation emitted by a wave length of 2537 A. Samples of tap water were compared including: (1) Unfiltered water, (2) water filtered through sand, (3) water filtered through a single layer of paper and (4) water filtered through different grades of asbestos filter pads. From the chart it is apparent that preliminary fine filtration increases the capacity of the ultra-violet germicidal unit.

Retention of Carbonation

Another application of depth filtration is to aid the retention of carbonation. If suspended matter has been removed, carbon dioxide gas tends to be retained when the cap is taken off the bottle.

An interesting test is to open a chilled bottle of carbonated or "sparkling" water and flick cigarette ashes into it. The ashes act as release points and rapidly free dissolved carbon dioxide gas. The water then rushes out of the bottle.

Other Applications

Asbestos filter pads are used for ultra-fine filtration in industries other than the soft drink industry. For example, edible oils are filtered to remove finely suspended matter and traces of moisture likely to produce an unsightly haze. Wines, also, are filtered to a sparkling brilliance without affecting their bouquet.

The denser or finer filter pads are used to cold sterilize certain products, and contribute largely to the successful commercial production of blood plasma, penicillin, vaccines and serums.

The comparatively coarser pads are used for filtering drinking water to a turbidity of less than 0.1 p.p.m. Such pads are effectively used to remove the organism *Entameba histolytica*, which is extremely resistant to chlorine. Millions of these pads were used by the Armed Forces during the last war for purifying drinking water.

Why Asbestos Pads Are Used

Asbestos retains extremely fine particles, and at the same time it is inert. When used in conjunction with other filter aids, the rates of flow and the length of the filtration cycle are affected by impurities and slight variations in the type and amount of asbestos fiber. Consequently, the benefits of asbestos fiber used for filtration can be controlled by using preformed asbestos pads in a filter press. In using these filter presses, the rate of filtration

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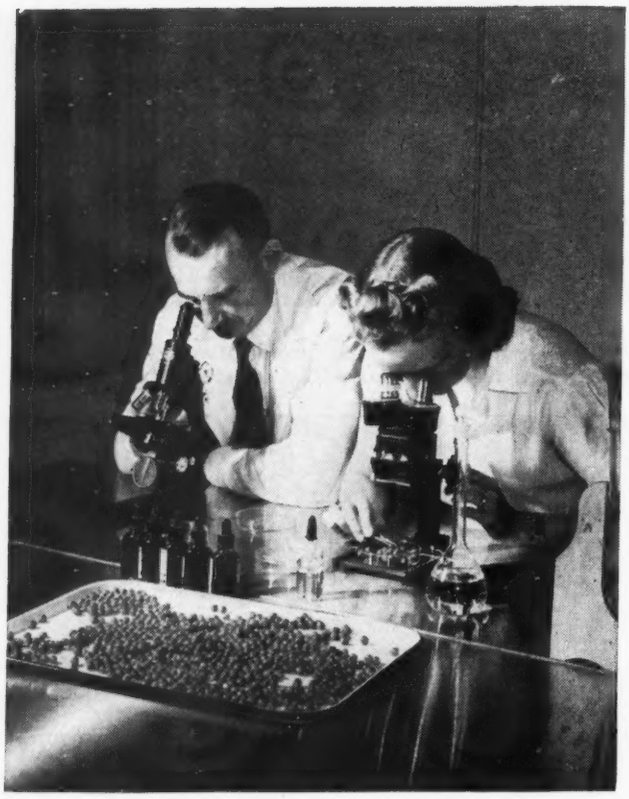


HIGH POWER microscope (left) is used for making direct bacterial count, index of the condition of the product.

How Good Are You?

Here is a little questionnaire which will give you a chance to evaluate your production control staff.

1. Do you have a cleanup crew?
2. Do they operate (a) at the end of the day's run? (b) twice a day?
3. Does some one individual have complete responsibility for the care of these operations?
4. Does the man in charge of this operation use detergents?
5. Are they detergents that are specified by your laboratory or some other qualified laboratory for the various cleanup operations?
6. Does your operations group understand that germicidal compounds have no utilization in a food plant unless accompanied by real cleanup operations that chemically and physically remove dirt first?
7. Are any bacteriological tests conducted on your materials as received?
8. Does your organization have any bacteriological standards for raw materials?
9. Are microbiological tests used for determining effectiveness of equipment cleaning in your plant?
10. Have you any microbiological tests for final products?
11. Does your laboratory use direct microscopic counts on raw or finished products?
12. Do you have a laboratory?
13. Are inspections made for insects or insect fragments in products?
14. Is your water supply checked for purity at least once a month?

Improving Frozen Foods Through Microbiological Control

Direct microscopic count will reveal contamination while operations proceed, permitting corrective measures before any serious trouble develops. Possibilities for improvement through research cited*

By BERNARD E. PROCTOR, Department of Food Technology, Massachusetts Institute of Technology, Cambridge, Mass., and

JOHN T. R. NICKERSON
National Association of Frozen Food Packers, Washington, D. C.

IN the past, the standard bacterial plate count has been used to determine bacterial populations of foods, and this is still a good means of resolving the sanitary quality. The only changes of significance recommended for this procedure in recent years as applied to frozen foods have been the use of a larger sample (50 grams of product instead of 10 or 11 grams), breaking up of the sample with a blender type of disintegrator, usually a Waring blender, and the use of Tryptone glucose agar instead of nutrient agar.

The plate culture or viable bacterial count serves its purpose and should be made periodically. The inadequacy of this procedure, however, lies in the fact that it is necessary to wait for a period of two or three days before the test can be carried to completion. For this reason the direct microscopic count should be considered. By this method, results may be obtained in from 20 to 30 minutes. The apparatus and reagents necessary for carrying out the direct count are not too complicated, the most expensive item being a compound microscope. A technician to conduct the test can be trained in a short time.

In view of the equipment necessary for the plate count and the greater amount of labor involved in using the

*From a paper presented at the National Frozen Food Industry Convention at Chicago, March 18.

plate count, the microscopic method has much in its favor. In speed, the direct microscopic method has a tremendous advantage over the plate count. To use the plate count alone for quality control purposes is analagous to locking the stable door after the horse has been stolen. The microscopic count, by contrast, can be used while plant operations proceed, to detect the source of contamination and microbiological growth in foods, and corrective measures can be initiated in time to avoid serious difficulties, which may otherwise occur.

Because the microscopic method determines both living and dead bacteria, higher counts usually must be expected with this method. The direct microscopic count provides information regarding the sanitary history of food, whereas the viable count is an aid to the determination of the sanitary future of the product if it is exposed to conditions that support microbiological growth. In addition, the viable count indicates the type of microorganisms present in a food, which may be of great importance. In any case, after a reasonable amount of experience by the laboratory staff, adequate allowances can be made for the higher results obtained by the direct count.

In the production of frozen precooked foods, the use of direct microscopic counts is almost a necessity, because with such products the presence of large numbers of bacteria, especially of certain types of bacteria, may constitute a menace to public health. This is apparently less true of other kinds of frozen foods. Another advantage of the direct count, at least so far as frozen precooked foods are concerned, is that the method can be used to check any of several raw materials that may be combined in the final product, and thus spoilage of the mixture caused by some one poor component can be obviated.

Other Control Methods

The Howard method of counting molds and that of counting fragments of rot have been used for some time as a means of controlling the quality of fruits. Although these methods are subject to some criticism, no better methods are available for this purpose at the present time. As these procedures are commonly used by regulatory agencies interested in product quality, it is to the advantage of the processor to become acquainted with such tests and to use the same procedures, whenever possible, to *improve* the quality of his product. The use of objective methods to determine the presence of insects or insect fragments is also good insurance.

Microbiological Standards

At certain times in the past, bacteriological standards have been proposed as a sanitary index for frozen foods. There has been no general agreement as to what the permissible limits should be in the maximum number of bacteria per unit weight of product. It is doubtful whether sufficient work has been done thus far to provide adequate data for the setting up of overall microbiological standards for many frozen food products, but it is obvious that different products may require altogether different standards. More is being learned about these levels each season. Each frozen foods producer should have his own standards of this kind, and his specific organization should be continually striving to meet the standards it sets. Wherever this has been done in the food industry, the product has been improved as a result.

Once a standard of this type has been set and the manufacturer has found that it is possible to attain an objective of this kind, a higher standard can be used as a goal. The extent to which a food product can be improved in this manner is substantial. To illustrate, practically all milk now meets the standards set two decades ago for Grade A milk. Grade A milk now has to meet much more rigid standards and is a far more superior product to that which met the former standards. We believe no milk producer or consumer would welcome return to lower standards of quality.

Microbiology

In the past the accent on microbiological research has been placed on plant sanitation. The direction of efforts toward such objectives has had good effects, and there is a possibility of obtaining even better results in this manner, for good products may be spoiled by poor processing. It is a fact, however, that in many instances greater deterioration of product takes place before the raw material is brought to the plant or while it is awaiting processing than during processing. Much consideration, therefore, should be given to the handling of raw materials from the standpoint of deterioration that may be caused by the growth of microorganisms. As those conditions that favor the growth of bacteria, yeasts, and molds generally facilitate enzyme action, anything that can be done to prevent the growth of microorganisms may help to prevent whatever deterioration is caused by enzyme action that may take place prior to processing.

Among the vegetables of greatest importance to the freezing industry are green peas. Those handling this product are aware that peas are vined in such a manner that the raw product is covered with vine juice, which is an excellent medium to support the growth of bacteria. The consequence is that the raw product may deteriorate considerably before it reaches the plant or before it is processed. This deterioration may be caused by both bacterial and enzyme action, but the small amount of research that has been done on this phase of processing indicates that the former is the predominating cause. Off flavors may be in evidence in the final product, if vined peas are held for a maximum of 6 to 7 hours before processing, even in areas where prevailing temperatures are relatively low.

The problem of spoilage of raw product may also be attacked from the perspective of precooling. What are the possibilities of precooling in such a manner that the material being cooled does not come in direct contact with the cooling medium? What are the possibilities of using a cooling medium that does not dissolve solids from the product? It may eventually be possible to use some type of non-toxic bactericidal agent for purposes of treating raw material of this kind, in order to prevent the growth of bacteria for sufficient periods of time to allow processing before deterioration starts.

From the standpoint of sanitary maintenance and cleaning procedures, much can be learned from the dairy industry in the design of heat exchange equipment, pipelines, and joints.

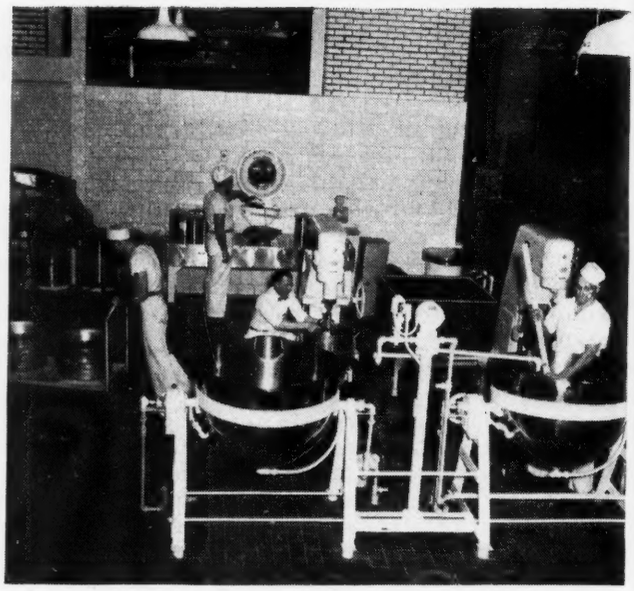
There is also the possibility that one day a new and better type of viner may be introduced. A viner that would shell peas without breaking cell tissues and without covering the peas with vine juice would no doubt largely eliminate deterioration resulting from both bacterial and enzyme action.

Holding Fruits

Fruits offer a more difficult problem. It is a fact that at times it becomes necessary to harvest greater amounts than the processing plants can properly handle. There is the possibility of using refrigeration for holding certain types of fruit. This problem, therefore, might be attacked with the view of determining what temperatures and times of refrigerated holding may be used to obtain suitable results. Gas storage has been used to advantage to facilitate the holding of certain fruits. It may be possible to apply this type

(*Continued on page* 214)

MIXING dough to a uniform consistency in an air conditioned room at Walter Freund Baking Co.'s new plant.



COOKING fruit fillings in steam jacketed kettles. Fresh fruits are stored in a cooler. Out-of-season are frozen.

Air Conditioning Improves

By controlling temperatures during the dough making operations, even

By ROBERT A. LATIMER
St. Louis, Mo.

USE of air conditioning has solved a common problem in bakery operations at the Walter Freund Company's new pie plant at St. Louis, Mo. The problem has been the tendency for pie crusts to break down and bake unevenly when the doughs have been kept without temperature control during the dough making operations. The solution at Freund's has been the installation of air conditioning facilities which maintain adequate temperature and humidity control.

Many experiments were made by the Freund organization on maintaining uniformly high quality in pie crusts and fillings. The tests were undertaken to find a method of compensating for weather conditions, which, in St. Louis, are unfavorable for pie making. Results showed that controlling the operating temperature to within a few degrees assures uniform pie texture and high quality fruit filling.

There is a real demand for a top quality pie in hotels, restaurants and other food service institutions. A survey made two years ago by the Freund organization disclosed this demand and, also a market for the small tart-size pies in protective packages to be sold by grocery, drug and confectionery stores.

Plant Construction

A new $500,000 bakery was built accordingly to provide the St. Louis market with pies. The plant, covering an area of 50,000 sq. ft., is built on three levels. In the sub-basement, fresh fruits are stored in a walk-in refrigerator and out-of-season fruits are frozen and stored in a sharp freezer of two-carload size. The street level floor houses the distribution department and the garage for the fleet of 16 delivery trucks. The third floor is used exclusively for the pie manufacturing operations.

Walls in the plant are of white ceramic tile, the floors of waterproof brick. All equipment is made either of stainless steel or tin-plate, durable and easy to clean. Racks used for moving pies are custom-built of aircraft aluminum.

A most important installation is the air conditioned enclosure used for the dough making operations. Here temperature is held between 70 and 75 deg. F. and the humidity is controlled at 75 percent.

The air conditioning in this 90 ft. x 35 ft. area is accomplished by a series of fan and coil blower stations. These are refrigerated by condensing units, mounted above the enclosure. The condensing units are water-cooled with a York water-saver unit. Thermostatic controls in zones keep the temperature uniform, regardless of production speeds and the number of people in the room.

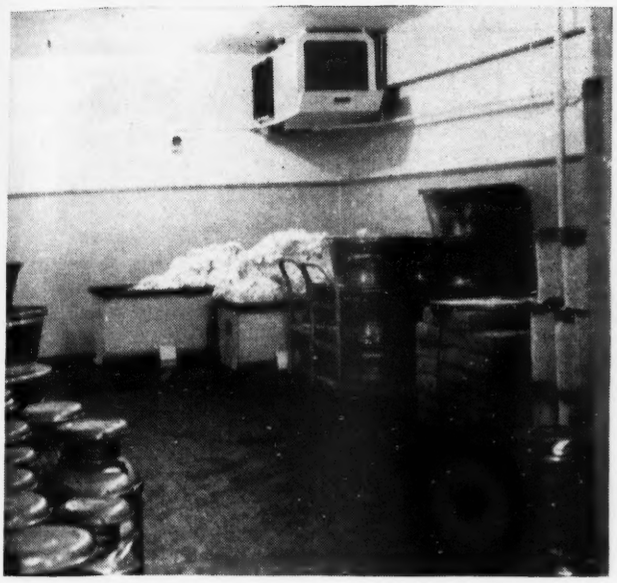
Making the Pies

The ingredients are mixed in a definite order. First the shortening is weighed and placed in an Artofex Pie Dough Mixer. Flour and milk powder are sifted into the mixer with an electric flour sifter. After the shortening, flour and milk powder have been thoroughly mixed, water, salt, sugar and egg whites are added.

The mixer operates for about six minutes, after which the dough has become pliable. Dough consistency is controlled by the amount of water used and the length of mixing time.

When the dough has been formed, it is loaded into dough troughs. The troughs are wheeled into a walk-in cooler where the dough is chilled. After chilling, the dough is checked and scaled to the desired weight and size by automatic dough scaling machines. These machines produce 2,000 nine inch crusts or 6,000 "pocket size" crusts an hour.

The scaled dough is pressed into



PIE DOUGH is chilled in a walk-in cooler before crusts are made. Cooked fruit fillings are also cooled.

AUTOMATIC dough scalers form the crusts. Crusts are pressed into tins, fruit added and pies covered with crust.

Quality of Baked Pies

baking, uniform crust textures and quality fruit fillings are assured

pie tins and passed to an operator who fills them with fruit, using a hand dipper. The tins then travel by conveyor to another operator who puts on the top crust.

Pies next are carried on stainless steel wire mesh conveyors to continuous Baker Perkins single lap tray ovens. Small fruit pies are baked at 550 deg. F. for about 14 min. The large fruit pies are baked at 450 to 470 deg. F. for 28 to 60 min., the kind of fruit determining the baking time.

An interesting development is the Alemite air pressure pump, used for inserting precooked apple juice into freshly-baked pies.

After baking, the pies are removed from the ovens with aluminum pie forks. These forks hold four large pies or 16 small ones. The pies are loaded on racks and pushed to the wrapping department.

In the wrapping department, the small pies are removed from the tins and packed into individual cartons. The cartons are folded automatically, 100 per min., on a Bemis-Jason Box Forming machine. After packaging in the cartons, the pies travel by belt conveyor to a model F. A. Package Wrapping Machine for overwrapping with P. T. Cellophane and gluing.

The large pies are not wrapped. They are, instead, loaded into aluminum pie cabinets and delivered by truck to hotels and restaurants. Each truck delivers about 500 pies in one trip.

When this new pie plant began production last January, 70 new workers were hired and trained. Most of this personnel had no previous experience in baking. Therefore, they were given a two weeks' "accelerated course" conducted in the company's visual-training auditorium and classrooms. Production during the first few months was supervised by Monroe Boston Strouse and an assistant.

BAKED pies are removed from ovens with aluminum pie forks, loaded on racks pushed to wrapping department.

TART-SIZE pies are packaged in cartons, which are overwrapped in Cellophane. Pies are packed 40 to a container

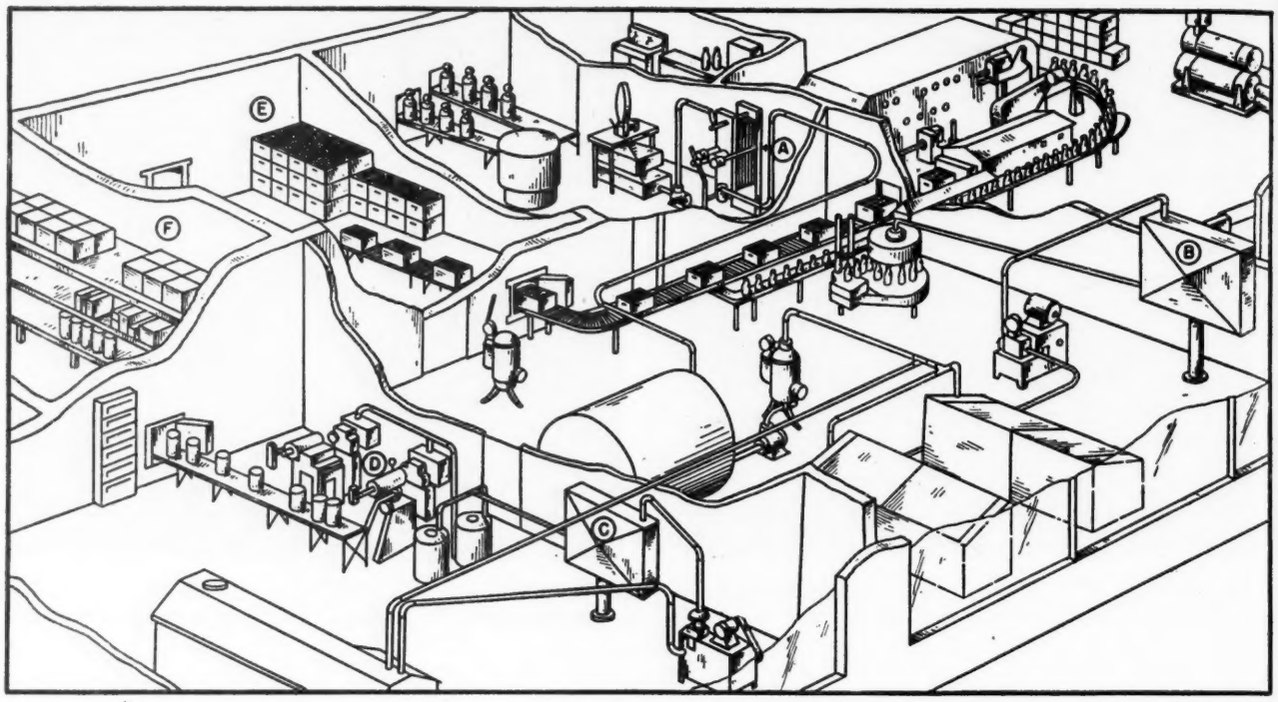


FIG. 1. REFRIGERATION is required in a modern dairy plant to cool raw milk upon arrival (A); pasteurized milk before bottling (B); ice cream mix (C). Also for freezing ice cream (D); maintaining temperature of milk storage room (E) and ice cream hardening room (F).

Reducing Refrigeration Costs In The Dairy Plant

Peak cooling requirements over a short period result in high electrical demand. Maximum use of cold well water for raw milk cooling and latent heat storage for pasteurized products reduces peak, cuts processing cost

By R. J. RAMSEY, Ramsey Laboratories, Cleveland, Ohio

BECAUSE of the large tonnages required, refrigeration is an important item of processing cost in the dairy industry. In order to improve its efficiency, a better balance between processing schedules and available refrigeration, particularly from the standpoint of eliminating peak loads, is needed in many plants. Generous use of cold well water, when available, will greatly reduce the load on the mechanical refrigeration.

To see where savings may be made in refrigeration costs, let us follow some common products through a typical dairy plant. See Fig 1.

As milk is collected from the farms it is usually delivered to the processing plant at a temperature between 65 and 75 deg. F. Whenever possible, it is advisable to take this milk directly to processing without cooling. This is not always practical, however, since in most plants the raw milk is received at a rate much faster than it is processed. The excess must be refrigerated promptly, otherwise it will sour or increase in acidity and cause serious processing difficulties. The owner is faced with the choice of: (1) Buying refrigerating equipment to cool the milk, or (2) putting in additional boilers and equipment to process it as fast as it is received. In the case of fluid milk operations, with short time pasteurization completing the entire process in a matter of a few seconds, we can regain a lot of this extra refrigeration by means of regeneration.

For cooling raw milk we have a choice of city water, well water, sweet water, brine or direct expansion ammonia. City water is usually so warm that it is of little help in cooling raw milk. It is, therefore, given little or no consideration in this connection. Where large quantities of well water are available at a temperature approximate 52 to 54 deg. F., this can do a large part of the cooling job. Water should be used generously under such conditions.

Brine is rapidly fading out of the picture for most cooling. We either use sweet water or direct expansion. The difficulty in using direct expansion on raw milk cooling is that we must have enough compressor capacity to take care of the high peak. This does not permit the greatest economy in regards to the purchasing of electric power because of the peak demand loads. If there were ever a place where latent heat fitted

into the dairy picture, it is in raw milk cooling. Here is a load of great tonnage and one which occurs over a very short period of hours. Great economies can often be made by installing latent heat plants for raw milk cooling.

Pasteurized Milk Products

Most dairy products are pasteurized at temperatures ranging from 142 to 180 deg. F., depending upon the type of products and on the method of pasteurization. After pasteurization, the product is cooled as low as possible by city or well water before mechanical refrigeration is used. Where well water is available it is of course advisable to use it to the greatest extent. It is not generally practical to cool pasteurized products below 65 deg. F. with water.

One point we might consider here, is the fact that, even though milk may be cooled to 38 deg. F., it is usually placed in warm bottles and warm cases. The average temperature of the milk in the ice box under such conditions is approximately 48 deg. F. We may do a lot of figuring on how to get milk one or two degrees colder in the final milk cooler and then turn around and place it in a hot bottle where it is warmed 8 to 10 deg. The problem, therefore, is in cooling the bottles and cases and not so much the cooling of the pasteurized milk.

When paper bottles are filled, we do not have the temperature rise which normally occurs with glass bottles. For that reason, the milk is considerably colder when it is loaded onto trucks. The difference in temperature materially changes the problem of refrigeration on the trucks, particularly from the standpoint of icing.

Cooling of cream is rather difficult, and poses many problems which are not encountered to the same degree in other dairy products. In the first place, cream is a valuable product and is highly perishable. It must be carefully handled to maintain quality at all times.

One of the difficulties in handling cream is that the quantities are rather small. This does not permit the use of continuous methods of processing, pasteurizing and cooling. Using one separator and a 500 gal. cream vat for example, approximately 1100 lb. of cream are accumulated per hour. It requires approximately 3½ hr. to fill the vat, 30 min. to heat the cream to pasteurizing temperature, 30 min. to hold at this temperature and approximately one hr. to cool. Approximately 5½ hr. have elapsed from the time separation was started until the last cream is cooled and placed in the ice box. This is not conducive to good quality and causes many difficulties. By the use of small vats, say 100 gal. capacity, rotated so that one vat is filling while the other is being processed, continuous handling of the cream is insured. How does this all tie in with refrigeration? It is obviously better practice to use small vats and have the cream go to the cooler rather constantly. This reduces the size of the surface cooler required and the peak tonnage of refrigeration necessary.

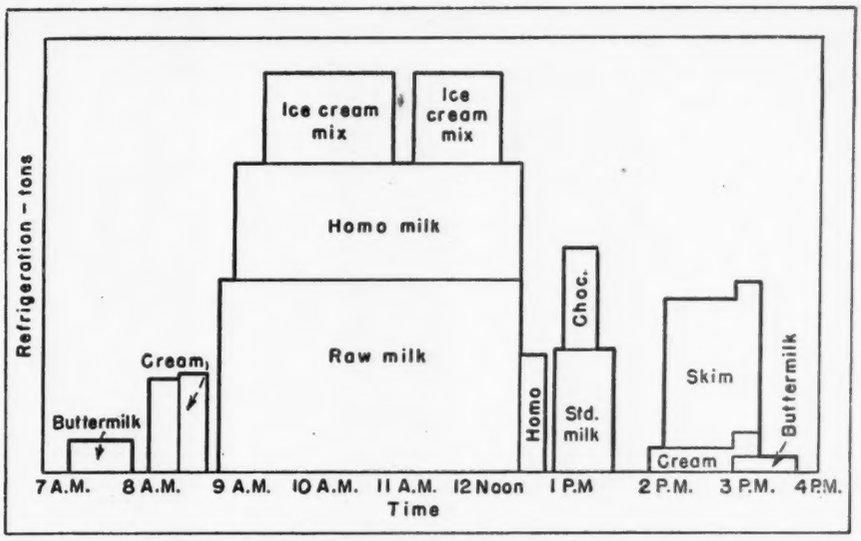


FIG. 2. THERMOGRAPH of product cooling shows how refrigeration load is concentrated during time when demand charges on electricity are highest.

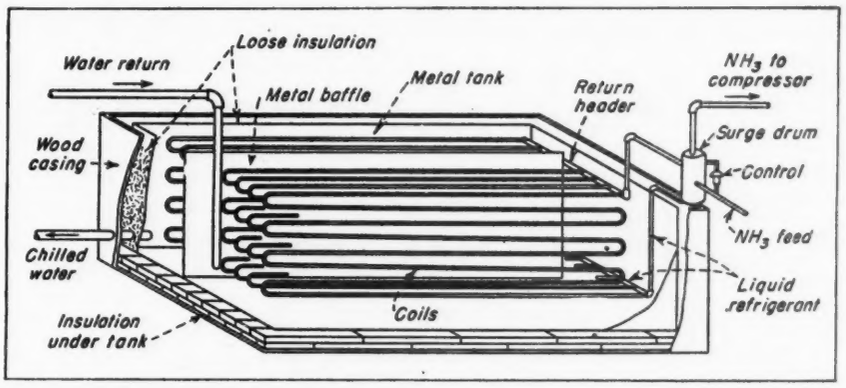


FIG. 3. LATENT HEAT PLANT consists of a series of refrigerated coils or plates submerged in water. By running a compressor during off-peak hours ice forms on the coils and refrigeration is stored for cooling operations next day.

Refrigerating Medium

In mechanical cooling of raw milk or pasteurized dairy products, we have a choice of the following mediums.

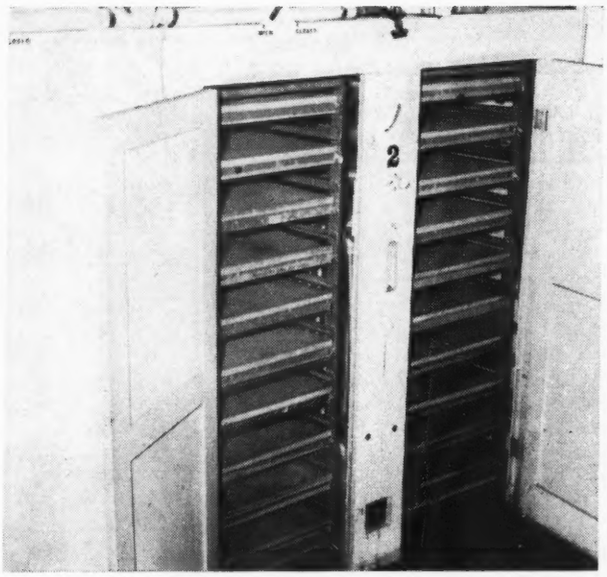
(1) Direct expansion
(2) 34 deg. F. sweet water
(3) Calcium chloride or ethylene glycol brine
(4) Ice accumulation latent heat plant (34 deg. F. sweet water)

For many years brine made from calcium chloride was the most common refrigerating medium used in milk and ice cream plants. Because of the many disadvantages which have been encountered, particularly from the standpoint of corrosiveness and trouble from leaks, the use of brine is rapidly decreasing. The old brine systems had advantages from an operating standpoint in that they gave somewhat of a flywheel effect and allowed some refrigeration to be stored. The amount of refrigeration storage was reasonably small, however, and the troubles have been numerous enough to cause brine to lose out.

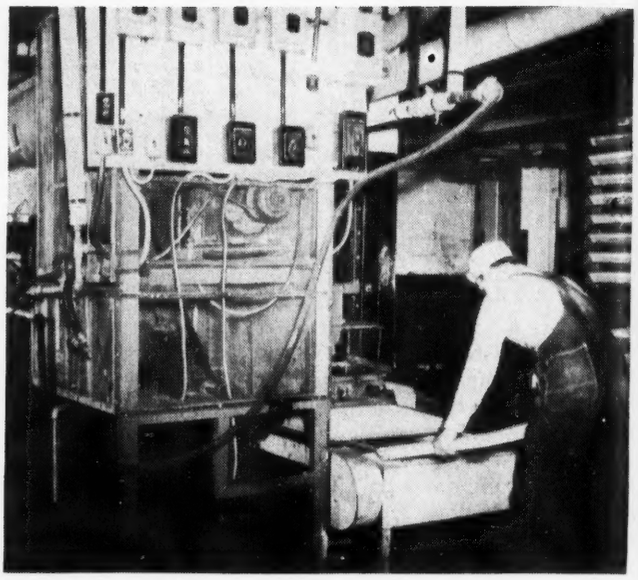
Many milk plants went from brine to direct expansion ammonia systems, particularly with the introduction of the new stainless steel coolers which could be built reasonably light and strong enough to stand the gas pressures. These cabinet, or fan coolers, have been very popular and direct expansion has been used in many plants.

Recently, however, the trend has swung back to the use of 34 deg. F. sweet water. One of the big reasons

(*Continued on page 212*)



MOTHER CULTURES are grown in special trays, placed in incubators that provide ideal conditions for sporulation.



LOADING sterilized trays with inoculated substrate. Trays are then loaded on trucks which travel into culturing tunnel.

Mold Enzymes Produced By Continuous Tray Method

Process is automatic, saves labor required to handle the culture trays and might be used to manufacture fats, organic acids and anti-biotics

By GEORGE A. JEFFREYS, President, Jeffreys Research and Development Co., Salem, Va.

CULTURING molds on a commercial basis for the production of enzymes used in some of the food industries is now accomplished by a new continuous process* that eliminates some of the disadvantages of previous tray culture methods, in particular, much of the labor required in handling culture trays. In this process, the substrate is sterilized, cooled, inoculated, fed on trays, cultured, dried in tunnels, ground and then bagged in a continuous operation.

The process was developed prior to World War II. Subsequently, a larger unit was constructed during the war, with most of the production used in the manufacture of industrial alcohol.

Several methods have been developed to culture molds commercially for enzymes, citric acid, gluconic acid, penicillin, and other substances. Only two of these methods, however, are commonly used. They are culturing (1) in liquids and (2) on solid media.

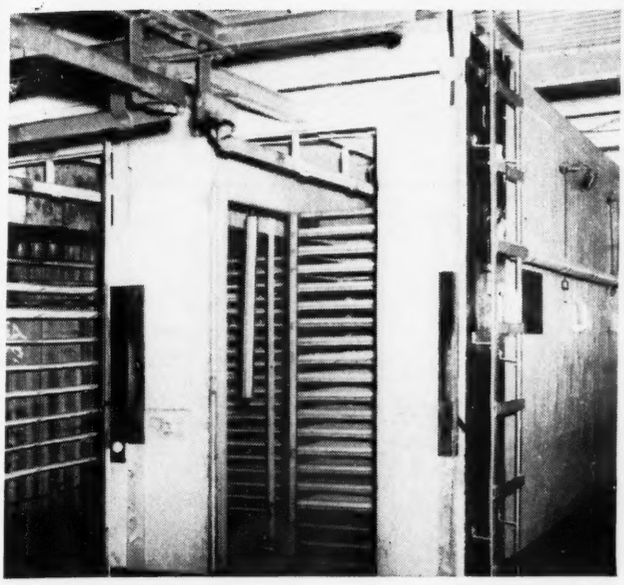
There are two systems also for the culture of molds on solid media. One is the drum method, and the other the quiescent or tray method. Both methods have certain advantages and disadvantages.

The tray method was the first one used. Later, when the drum method was developed, it was considered an improvement on the tray method. Underkofler[1] and Boyer[2] have described a successful method using stationary trays. Christensen[3] and Underkofler[4] have pointed out that the tray method produces a denser growth of mold with more potent products than the drum method. The chief criticism of the tray method has been its impracticality, since considerable labor is involved in handling the culture trays. Christensen[5] proposed the use of a travelling belt and pneumatic cell, but investigation proved this impractical. The time required to culture the molds necessitated the use of many belts, if production was to be accomplished on a volume basis. Mechanical improvements on the tray method, have put continuous process on a practical basis.

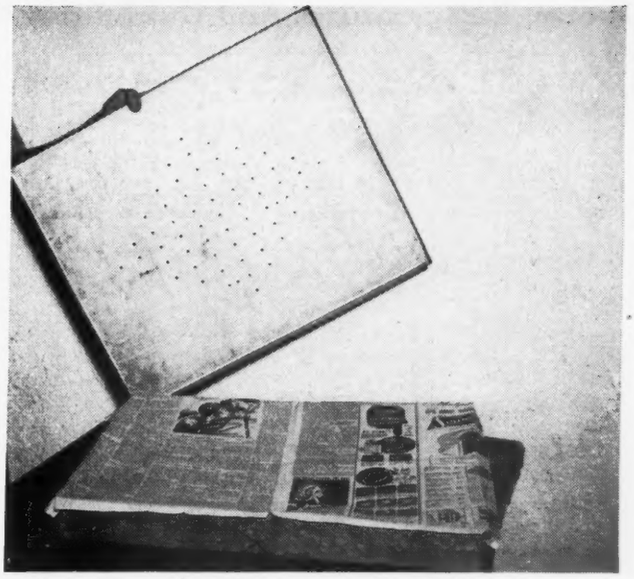
The use of mold enzyme is rapidly expanding into many fields. Some of the principle uses are: (1) Manufacturing sugar sirup,[6] (2) clarifying fruit juices, (3) making industrial alcohol, (4) producing protein hydrolysates, (5) tanning leather, (6) desizing of textiles, (7) manufacturing paper, (8) using for laboratory reagents and (9) manufacturing foods and medicines[7]. Plant scale opera-

* Patents Pending

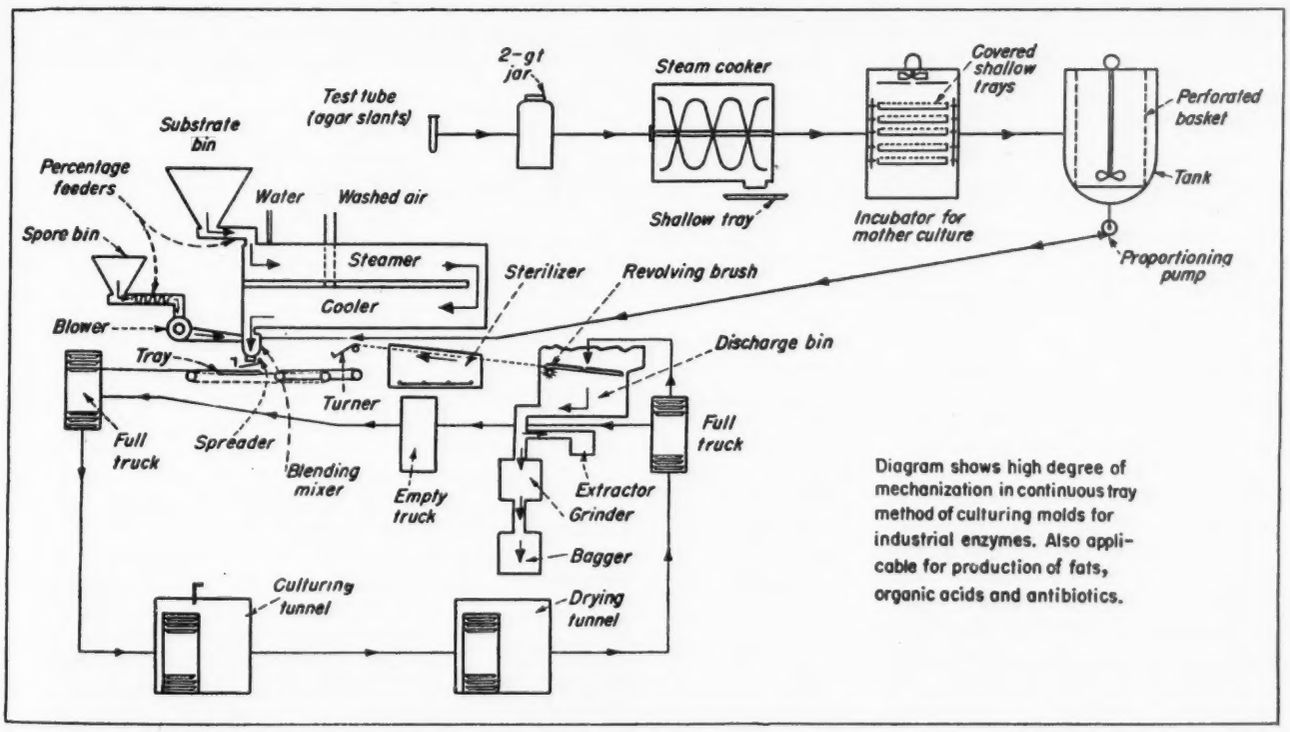
**Diatane is a trade name for a mold enzyme with diastatic and proteolytic properties and certain stimulating factors produced by molds cultured on vegetative material. By varying the methods of cultivation, and the mold strains, a Diatane can be produced for the saccharification of grain mashes, hydrolysis of starch, activation of inoculating worts and bacterial fermentations of many types.



CULTURING tunnel is designed for 40 trucks, holding 5,000 lb. of substrate. Here conditions are optimum for mold growth.



CONTAMINATION on mother culture trays is avoided with use of newspaper, which also serves as filter and absorbs moisture.



NEW CONTINUOUS tray method for the production of enzymes eliminates many of the disadvantages of previous tray culture methods. Process can be used also to culture molds commercially, to produce citric acid, gluconic acid, penicillin and fats.

tions using Diatane** have been successfully employed in the manufacture of alcohol by U. S. Industrial Chemicals, Inc. and others.

The Inoculum

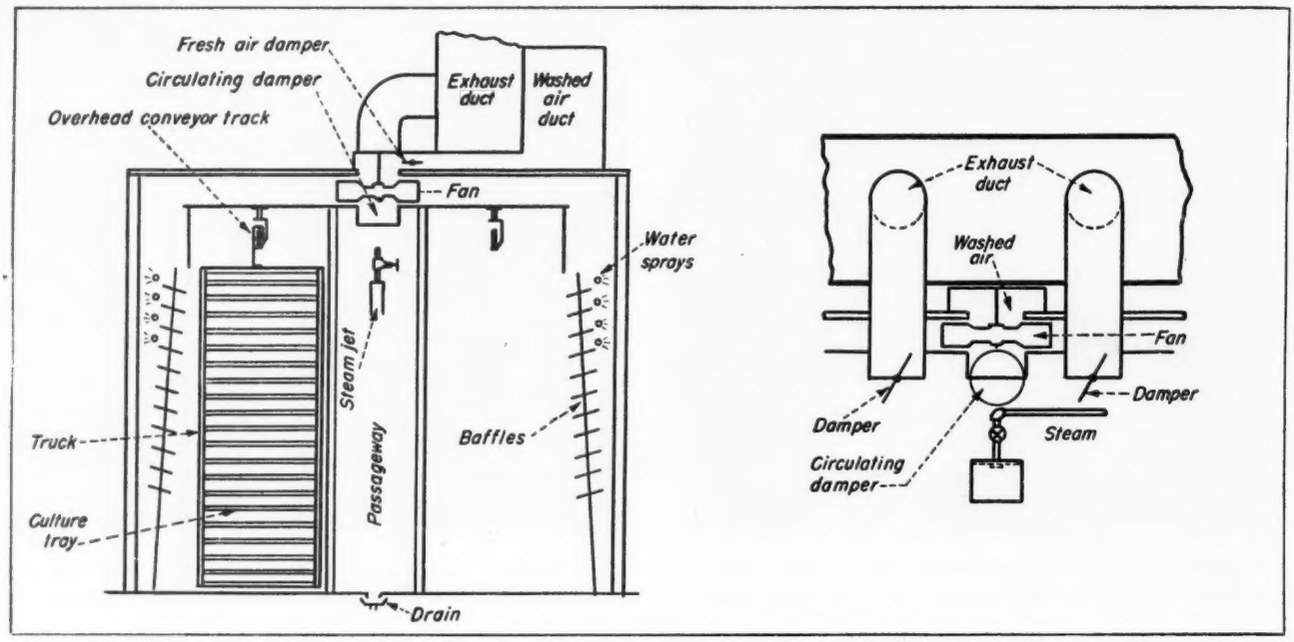
The mold *Aspergillus oryzae* (or its related sub-species) is usually used in the continuous tray method of producing mold enzymes, and a strain of *B. mesentericus* or *B. subtilis* is used for a liquifying enzyme. As with all large scale culturing methods, complete sterility is absolutely necessary and utmost precautions are taken to prevent contamination.

Pure mold cultures are kept on agar slants from which they are transferred to 2-qt. jars, partly filled with a sterilized moist bran substrate. Mold growth and subsequent formation of mold spores take place in these jars.

A jar of mature spores is enough to inoculate 100 lb. of bran or mother culture that has previously been sterilized in a cooker and then cooled. The mother culture is grown in specially designed, shallow, covered trays with perforated covers. To avoid contamination, a sheet of newspaper is placed over the trays before the covers are put on. The newspaper serves also as an air filter and absorbs moisture which would otherwise condense and drop upon the culture.

After germination starts, overheating is avoided by keeping the temperature of the air at about 78 deg. F. This is done with special incubators in the mother culture room. The incubators, employing forced draft circulation, are equipped with heating and cooling coils. The perforated cover and newspaper seal permit each tray to maintain suitable, humid conditions. The heat

Proper Temperatures And Humidities Are Kept In Culture Tunnel



TEMPERATURES in culturing tunnel (left) are controlled by dampers (right). Heat formed by germination is removed, cool and humidified air keeps substrate temperatures from going above 37 deg.F. and steam jets heat the air if temperatures are too low.

formed by the mold culture passes through the metal tray to the outside air. This system, therefore, provides ideal conditions for sporulation and, at the same time, does not require expensive equipment to humidify the air.

After the spores have matured, the covers are removed from the trays so that the spores may be dried. Sometimes the spores are not dried, but are used moist.

The main batch is inoculated with both moist and dried spores obtained from the mother culture. About 0.5 percent inoculum (on a dry basis) is used. Moist cultures are transferred into a perforated basket inside a tank and suspended in sterile water. The suspension is agitated and a proportioning pump forces it into a blending mixer, where it is sprayed on top of the substrate as it flows on the culture trays. In addition, dry spores are blown into the blender from a percentage feeder or a spore bin. By inoculating the main batch in this manner, insurance is provided against the possibility of one inoculum failing.

Sterilizing the Substrate

The material used for the substrate is sterilized and cooled continuously by a specially designed machine, the Diatane Sterilizer and Cooler.

A percentage feeder adds the substrate material from the storage bin into a conveyor, where it is mixed with the correct amount of water. While traveling on the conveyor, the substrate is steam-heated to 190 deg. F. or higher and held at this temperature for about 15 min. It then drops into a cooling conveyor, where it is cooled by a stream of cold, filtered air and a water jacket.

The substrate then passes into the blending mixer where it is sprayed with a suspension of spores and also mixed with dry spores. From the mixer, the inoculated substrate drops onto a spreader that automatically spreads the substrate evenly on sterilized trays. The trays then travel forward on a conveyor belt to the loading point. Here an operator places them on a truck holding 20 trays, spaced 4 in. apart. After loading, the truck travels into the culturing tunnel on an overhead trolley system.

Culturing Tunnel

After several pilot plant experiments, a culturing tunnel was designed to provide optimum conditions for the growth of the molds. To assure proper mold growth, suitable incubating temperatures and moist, humid conditions must be maintained. Furthermore, heat must be removed from the molds as fast as it develops. This is done with a continuous air circulating system, using overhead fans spaced 6 ft. apart. The fans are situated between the ceiling and sub-ceiling so that air can be drawn in by centrifugal force, either from a fresh air intake or from the tunnel for recirculation.

After 12 hr., germination begins and heat is produced. Not only must the heat formed by germination be removed, but the temperature of the substrate must also be kept from going above 37 deg. F. This is accomplished by running cool, humidified air through the fresh air damper while the circulating damper is closed. Hot air is exhausted through discharge dampers. Air, under these conditions, is first humidified in the central air washer and then by water spraying on the walls of the culture tunnel.

If the substrate must be heated, air in the center of the culturing tunnel is heated by thermostatically controlled steam jets. Then the fresh air damper is closed and the circulating damper is opened. Air is withdrawn from the center of the culturing tunnel through the circulating damper by the centrifugal fan and then forced to the sides of the tunnel. The air then travels downward to baffles that distribute it between the trays back to the center of the tunnel.

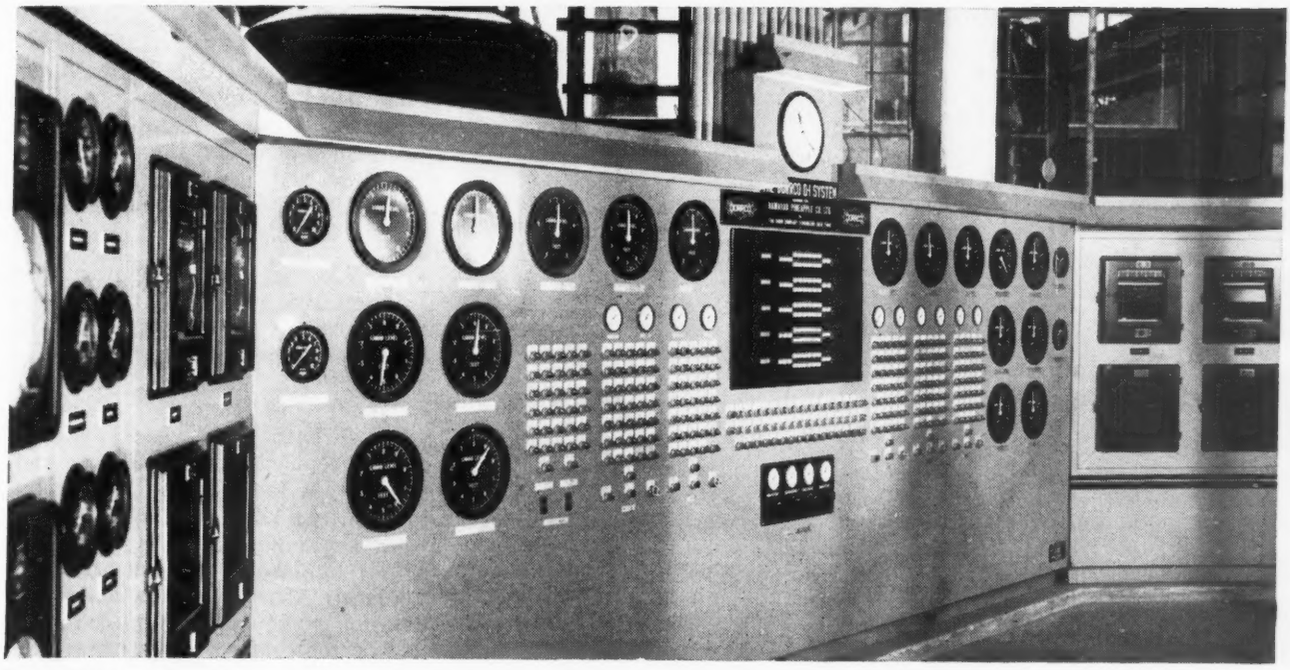
Drying Tunnels

After 24 to 30 hr. of incubation, the culture trucks travel through the drying tunnels, which are two stage center exhaust driers. The first stage uses the parallel flow principle and the second stage uses the counterflow principle. At no time during drying is the temperature of the culture permitted to exceed 110 deg. F.

When the culture has been dried to about eight percent moisture, the trucks travel out of the drying tunnel, opposite the discharge bin. The trays are unloaded from the trucks, emptied and loaded on a traveling

(*Continued on page* 219)

A SPECIAL FOOD INDUSTRIES REPORT.....



AUTOMATIC control for ion exchange operations at Hawaiian Pineapple Co.'s plant is centered on instrument panel.

Ion Exchange Finds New Uses

By RICHARD W. PORTER
Assistant Editor,
Chemical Engineering

Technologists in many food industries are finding ion exchange a useful new process "tool." It produces demineralized water cheaply, but has roused the greatest interest as a means of purifying sugar solutions. Other applications are the recovery of sugar from waste fruit juices, reduction of the calcium content of milk for infant feeding, recovery of lactose from whey, of tartrate from winery wastes, and of pectin from grapefruit peels. The technology of ion exchange is explained, the equipment described and the applications discussed.

TECHNOLOGY

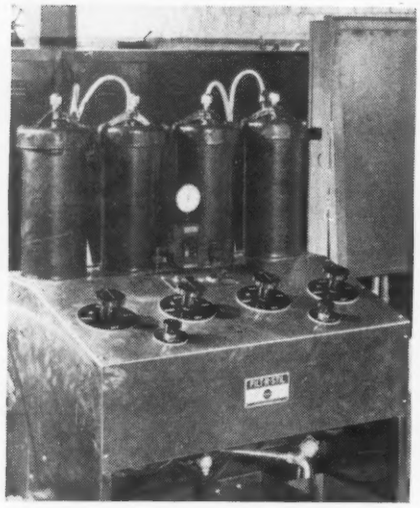
ION exchange is not new. But its importance to the food industry is increasing. It has long been used for softening water, and developments of the past 15 years have broadened significantly the scope of its application. Already employed industrially for a number of purposes, ion exchange currently is being studied and investigated in countless laboratories and pilot plants throughout the food industry. While relatively new to food processing, ion exchange has captured the interest of many food technologists who are finding it a useful tool in a variety of processes.

The two biggest fields for ion exchange so far are in treating water and purifying sugar solutions. Taking the spotlight now are the sugar and related branches of the industry where a dozen or more pilot plants have been operated and where commercial units, costing in the neighborhood of a million dollars each, have been erected and operated. Increased yields of sugar and improved quality of residual molasses have seemed to justify the major investment required. Similarly, the recovery of natural sugar in the form of potable sirups from waste fruit juices (such as pineapple, orange and grapefruit) has been carried out successfully on a large scale. In addition, pilot plant studies in treating corn sugar sirups have justified the inclusion of a deionizing unit in a new plant now under construction.

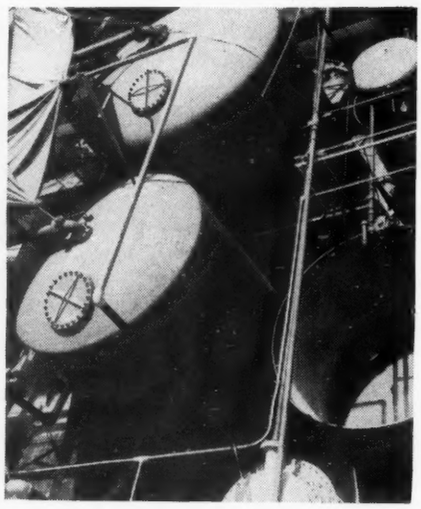
On the other hand, less spectacular processes should not be overlooked. Water treating is still the largest user of ion exchange. Demineralized water, the chemical equivalent of distilled water, can be produced at a fraction of the cost of distilled water. The versatility and flexibility of ion exchange have made it possible to deionize water on a scale and for purposes heretofore impractical. Demineralizing plants have been installed in capacities ranging from a few gallons to over 40,000 gal. per day.

Pure water is a "must" for many branches of the food industry. Especially is this true in the bottling of carbonated beverages where, in many cases, products are sold nationally but produced locally. While many factors contribute to the difficulties

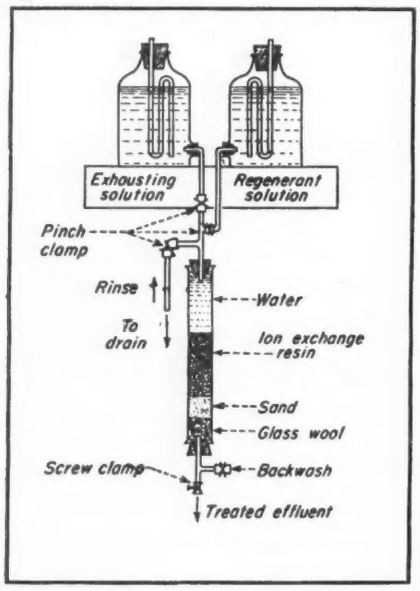
Installations Vary with Specific Application

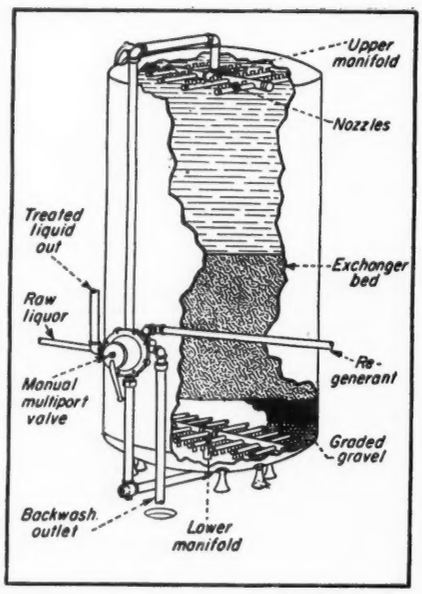


SMALL packaged units are used primarily for deionization of water.



LARGE installations for ion exchange are designed for particular service.





TEST cell (left) for laboratory experiment helps determine type bed for application. Some modification of filter bed (right) is almost universally used.

of obtaining uniform quality for a given brand product, the variations in water quality in different localities are one of the biggest problems. In general, demineralized water is desirable for certain phases of processing in most food plants. In addition, softened water is usually necessary for boiler feed water and for washing operations.

Although most research men consider the development of ion exchange processes still in its infancy, there are already many pilot-plant and commercial-size installations that provide a basis for an even broader scale of applications. Some of these include: Reduction of calcium content in milk for infant feeding; recovery of lactose from whey; recovery of tartrates from winery wastes; recovery of pectin from grapefruit peels. Undoubtedly, this list will continue to grow as more food technologists and researchers become familiar with the versatility and applicability of ion exchange processes.

What is behind the recent growth of ion exchange in the process industries? The biggest factor was the discovery in the mid 1930s that various types of organic materials possessed ion exchange properties similar to those of the siliceous zeolites employed for softening water. The advent of organic cation exchangers permitted the exchange of hydrogen as well as metallic cations and led to the development of anion exchange resins. This made possible complete deionization of solutions and paved the way for a whole new field of ion exchange applications. In fact, a number of processes such as deionizing sugar solutions, where base exchange with zeolites had been unsuccessful, now became feasible.

What is Ion Exchange

Practically any elementary chemistry text gives an explanation of the zeolite process for softening water by base exchange. This ion exchange process, used commercially for nearly 40 years, depends on the replacement of calcium and magnesium ions in hard water by sodium ions loosely attached to the insoluble zeolite. The value of zeolite (and any other ion exchange material) is that when the ions available for exchange are depleted they can be replenished by reversing the reaction (regenerating). Ion exchange, then, may be defined as the reversible interchange of ions between an ionizable liquid and a solid involving no appreciable change in the structure of the solid.

Two types of ion exchange are (1) cation exchange, where the positive ions in solution are exchanged for the positive ions of an insoluble matrix, and (2) anion exchange in which the negative ions in solution exchange with the negative ions of an insoluble solid or where acids in solution are adsorbed in an insoluble form on the solid. Reversibility of these reactions makes it possible to restore the original ions of the exchange material after its activity has been exhausted. This regenerability permits the exchange material to be used and reused through innumerable cycles. Eventual replacement of exchanger is necessary, however, due to unavoidable losses such as by attrition, backwash and carryover.

The mechanism of ion exchange can be illustrated by a few simple reactions. Cation exchange may be carried out in the so-called sodium or salt cycle (base exchange) and in the hydrogen cycle. In the salt cycle metallic ions in solution are replaced by the metallic ion of the exchanger (most commonly used in water softening where Ca and Mg ions are replaced by sodium):

$$2\,Na\,R + CaCO_4 \rightleftarrows CaR_2 + Na_2SO_4$$

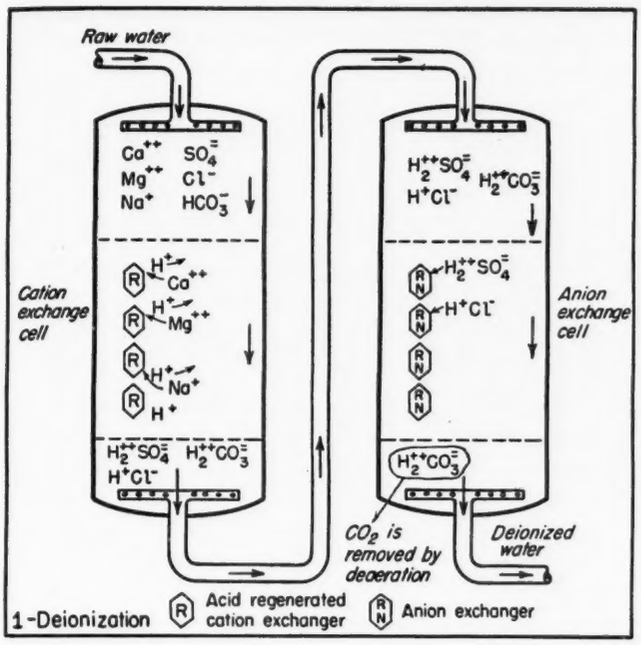
where R is the cation exchanger.

The exhausted exchanger is regenerated with common salt brine:

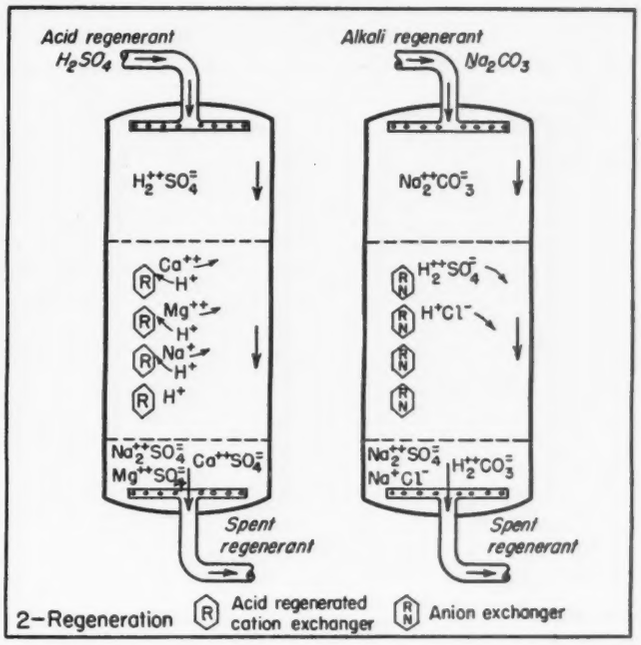
$$CaR_2 + 2\,NaCl \rightleftarrows 2\,NaR + CaCl_2$$

In the hydrogen cycle, however, ca-

Reversibility of Reaction Permits Regeneration of Exchange Bed



DEIONIZATION: Hydrogen ions attached to the insoluble exchanger are replaced by the cations in solution (Mg.., Ca.., Na..) and the acids so formed are adsorbed by the anion exchange resin.



REGENERATION: Exchange bed is backwashed with water, ions are restored to cation exchanger with acid and the anion exchanger is freed of adsorbed acid by neutralization with alkali.

tions in solution are replaced by the hydrogen ion of the exchanger, forming an acid in the effluent:

$HR + NaCl \rightleftarrows NaR + HCl$.

Acid regeneration is usually accomplished with H_2SO_4:

$2NaR + H_2SO_4 \rightleftarrows 2\,HR + Na_2SO_4$

Although the exact nature of anion exchange is not fully understood, it appears to take place as an addition reaction in which the whole acid molecule is adsorbed. Acids may thus be removed from solution:

$RN + HCl \rightleftarrows RN.HCl$

where RN is the anion exchange resin. Or true ion exchange may take place with an acid exhausted resin.

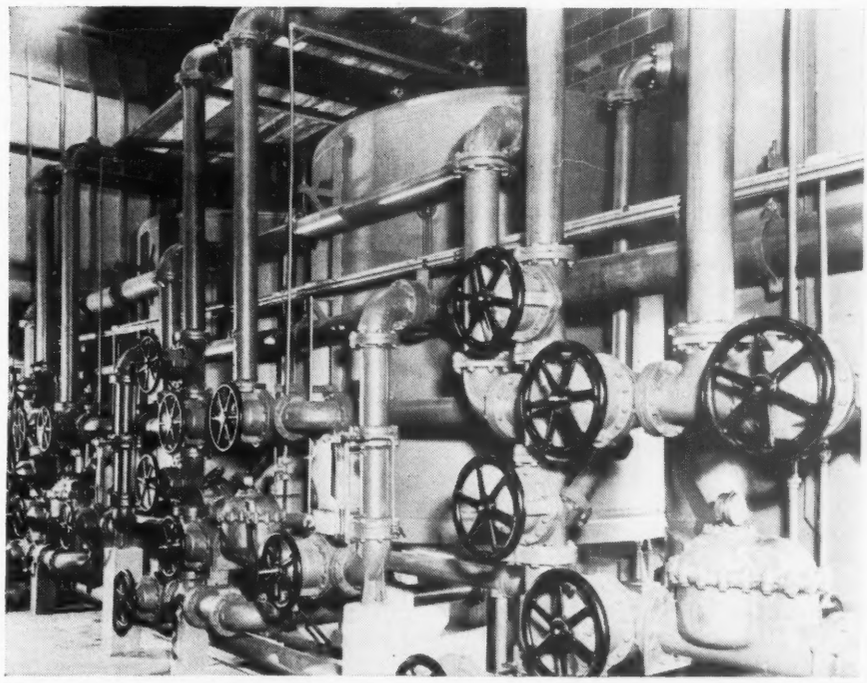
$2\,RN\,HCl + H_2SO_4 \rightleftarrows (RN)_2H_2SO_4 + 2\,HCl$

The anion exchanger may be regenerated with an alkali such as soda ash, caustic soda or ammonia.

$(RN)_2H_2SO_4 + 2\,NH_4OH \rightleftarrows 2\,RN + (NH_4)_2SO_4 + 2\,H_2O$

Since these reactions are governed by the law of mass action, an increase in concentration of products affects the completeness of reaction. For this reason an excess of regenerant is usually used so that regeneration of the exchanger will be essentially complete.

Exchange or adsorption of different ions depends on a number of factors. In general, divalent ions are held to exchange more firmly than univalent ions, and trivalent ions will usually displace the divalent ones. Ions of the same valency but of higher atomic weight are held in preference to those of lower atomic weight.

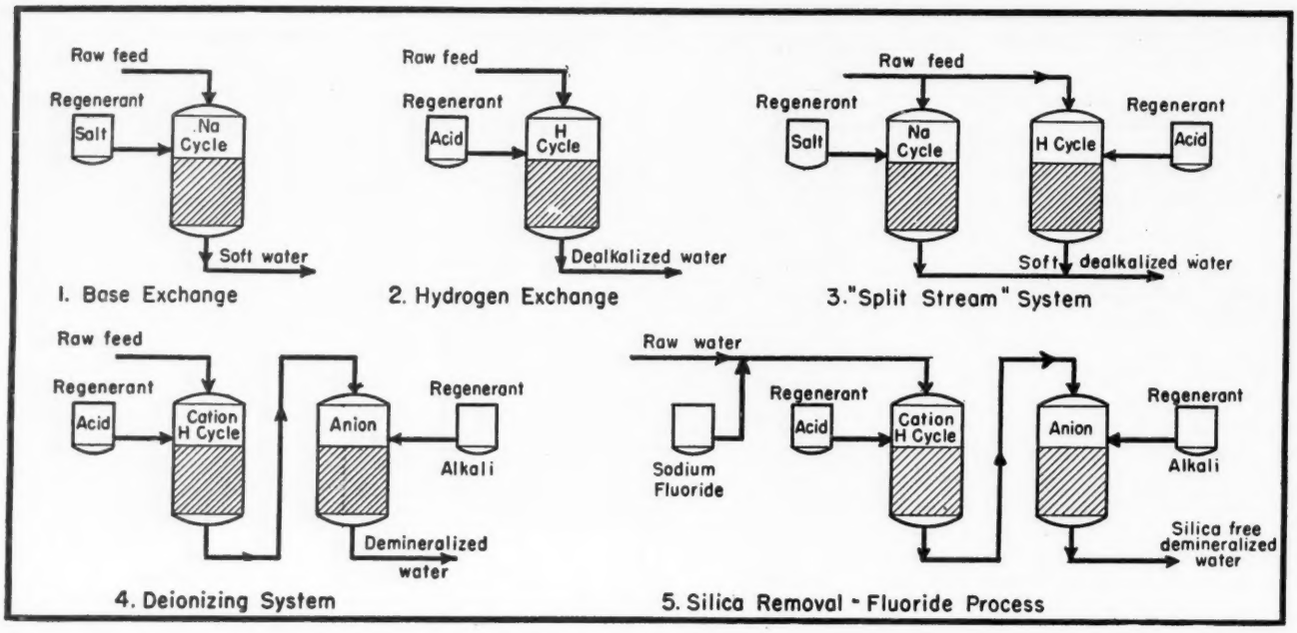


BATTERY of exchange cells illustrates complexity of valve and piping design on exchanger systems. Equipment is rubber lined to prevent corrosion.

New Ion Exchangers

Two general classes of ion exchange materials are used commercially, namely, inorganic and organic. Inorganic exchangers, the complex sodium aluminum silicates known as zeolites, are widely used for water softening. Zeolite is a term originally applied to natural inorganic sands that enter into a reversible chemical reaction with hardness ions, magnesium and calcium, in water. Natural zeolite (greensand), composed of hydrated silicates of iron, aluminum and sodium, is mined from the earth and processed until the granules are separated from other impurities. Synthetic inorganic materials made by

Water Treatment Is Still Principal Use for Ion Exchange System



WATER treatment is done with one of these five basic hookups. The five types represent most exchange installations.

fusing quartz, clay and soda ash are similar chemically to greensand but have a higher exchange capacity. Another material was developed by the reaction of sodium silicate and sodium aluminate solutions. All these operate in the sodium cycle—they exchange the metal cation sodium for calcium and magnesium cations in the water. Water of high or low pH value breaks down the material.

Most important in today's ion exchange operations are the organic exchangers. These fall in two classes: (1) The "carbonaceous zeolites" which are cation exchangers obtained by the sulfonation of coal or other natural organic materials and (2) synthetic resins for both cation and anion exchange. Cation exchange resins are phenol-formaldehyde, sulfonic acid derivatives. Anion exchangers are amine derivatives of either aromatic or aliphatic resins. The cation exchangers utilize ion active groups such as $—SO_3H$, —COOH, —OH and $—CH_2SO_3H$, while all anion exchangers depend on the $—NH_2$ group. Characteristically, these newer materials have high capacities for removing ions from solution and are relatively stable under a fairly wide range of operating conditions.

Organic cation exchangers may be regenerated with acid to operate in the hydrogen cycle or regenerated with salt to operate in the sodium cycle. From the standpoint of physical structure, ion exchangers are extremely insoluble porous materials whose walls contain a high percentage of tightly bound exchange groups. In appearance, they are granular solids in sizes ranging from 10 to 70 mesh and may vary in color from white to black. Densities of organic exchangers as shipped may range from 30 to 50 lb. per cu. ft. At least one resin manufacturer furnishes a cation exchanger in the form of spherical particles from 12 to 40 mesh. This is claimed to provide more uniform flow characteristics, lower backwash expansion and less attrition loss.

Although exchange capacity is usually stressed, a number of other factors are just as important in evaluating these materials. Some of these are: (1) Degree of removal of ions from solution, (2) chemical requirements for regeneration, (3) flow rates or throughput and (4) chemical and physical stability.

Perhaps the most important point relating to synthetic ion exchangers is the possibility of varying the properties by varying the synthesis of the resin. Thus it may be possible to develop ion exchange resins for specific purposes.

In general, ion exchange is carried out at relatively low temperatures. One manufacturer recommends that cation exchangers be used at temperatures below 140 deg. F. and anion exchangers below 110 deg. F. Considerable experimental work has been done on higher temperature operations but nothing conclusive has yet been determined.

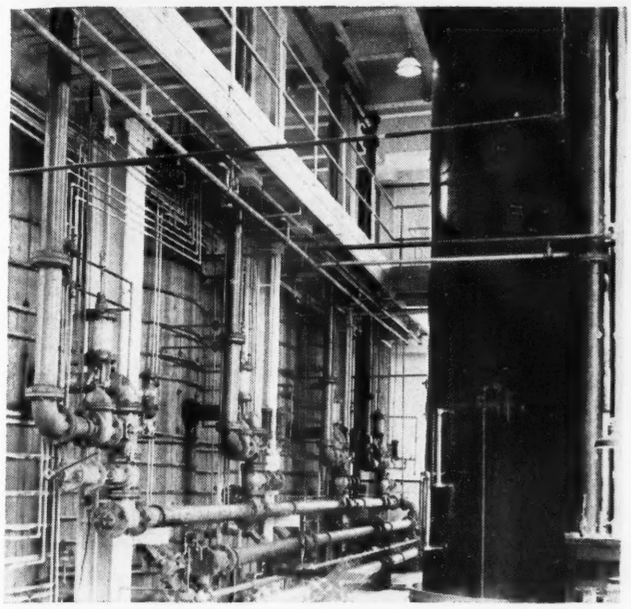
Equipment and Operation

Because ion exchange involves reaction between a liquid and a solid, the primary function of any equipment used for this purpose is to bring the reaction components into intimate contact so that exchange of ions may take place. This may be accomplished in a number of different ways, the most common method being to pass the liquid through a bed of ion exchange granules. Little fundamental difference can be discerned between most ion exchange units of today and the familiar zeolite water softeners, which in turn were patterned somewhat after pressure sand filters.

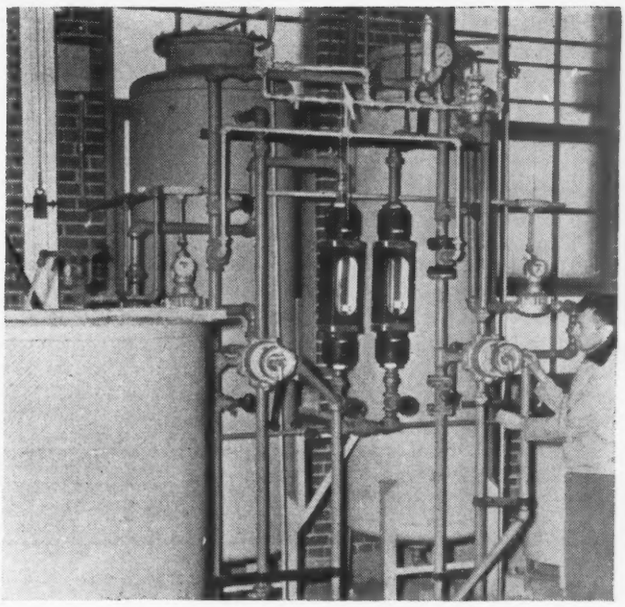
Ordinarily, the deionization operating cycle is comprised of four steps, as follows: (1) Reaction between exchange bed and raw liquor, (2) backwash to remove dirt and foreign matter retained by filter action and to reclassify the bed to prevent channeling of flow in the subsequent operation, (3) regeneration of exhausted exchanger by passing regenerant solution through the bed, and (4) rinsing the bed free of regenerant. The bed is then ready for the next cycle. To insure continuous throughput of liquor, three units are usually provided. At a given time one unit is on-stream, one is being regenerated and one is ready for operation.

Most equipment is of more or less standard design. Each unit consists of a cylindrical tank or column containing a bed of ion exchanger supported on a false bottom or on built-up layers of graded gravel or similar material. A collector device is built under the false bottom, and a system for distributing the raw liquor and the regenerant is installed above the exchanger bed.

Two Installations Show Diversity of Engineering Design



GRAVITY system for water treatment. Cation exchangers on top level discharge to anion units below.



SPLIT-STREAM system uses two cation cell units. One operates on sodium cycle, second on the hydrogen cycle.

An external piping system handles the flow of liquor, regenerant solution, backwash and rinse water.

One of the most critical factors is the design of the distributing system, because the liquor must pass through the bed without channeling. Uniform and efficient distribution of the liquor, regenerant solution, backwash and rinsewater is essential for economical and satisfactory operation. This is where different manufacturers claim superiority for their particular designs. Various arrangements of perforated piping such as spiders, circular sparge pipes and laterals are used for both distribution and collection. The supporting bed may be made of gravel, anthracite or tile, with the purpose of preventing the fine granules of exchange material from passing out with the effluent. It also aids distribution of the backwash.

Either upflow or downflow of liquor through the bed may be practiced, but downflow is more common. Flow rates are more critical on upflow operation since they must be sufficiently low to prevent carryover of material and high enough to suspend the bed partially to prevent channeling. Flow of liquor through the exchanger may be by force of gravity or under pressure. Open tanks may be used for gravity operation but where contamination of the solution might occur these are not desirable. Pressure operation, much more generally used than the gravity method, requires the use of closed vessels.

Because of the cyclic nature of the operation the external piping and valve system is necessarily quite complicated. Manual operation is practiced on many applications where the cycles are relatively long, but there is a definite trend toward automatic and semi-automatic control. Advantages of automatic control are well recognized, but in operations such as this, especially on complete deionization systems, they are quite pronounced. Labor savings, more uniform operation and, most important, reduction of the chances for manual manipulation of the wrong valves are well worth the expense of a control system.

Multiport valves and pilot operated diaphragm valves are widely used. The operation in the cycle may be properly controlled in sequence by a timer, volume measurement or by pH or conductivity measuring devices. Many of the modern ion exchange plants are being equipped with complete automatic control.

Size of Units

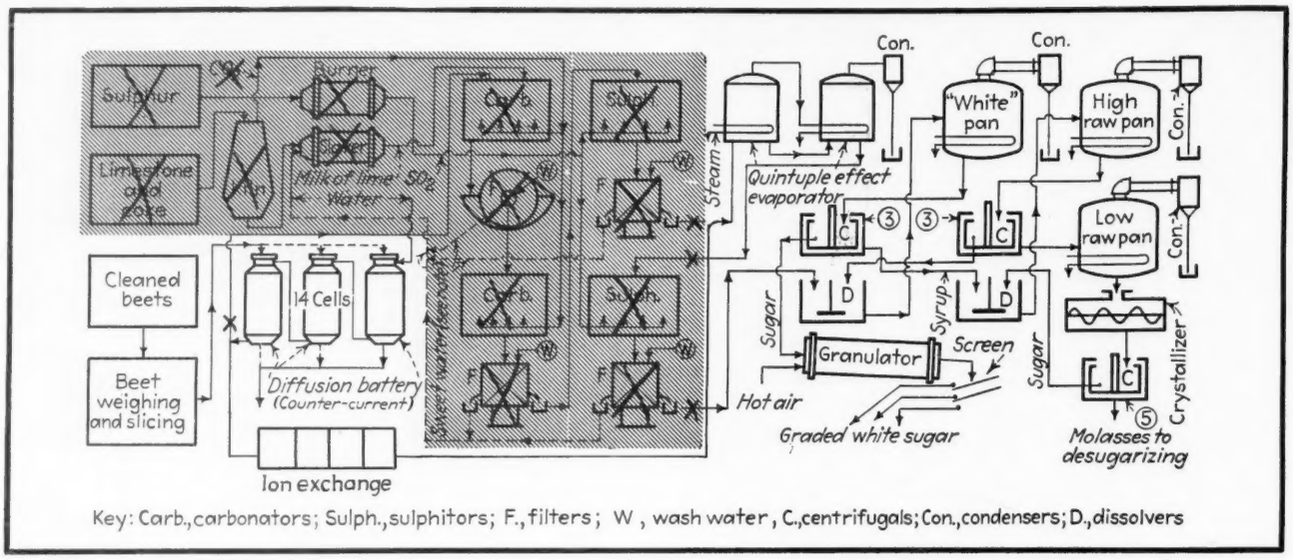
Deionization equipment has been built for capacities ranging from a few gallons up to millions of gallons per day. It is obvious, therefore, that the size and number of units may vary widely. Units up to 24-ft. dia. have been installed, but most tanks are 12 ft. or less in diameter to avoid the necessity for field fabrication. Throughput volume has usually been considered dependent on area of the exchange bed. Recent developments, however, have led to the belief that there is greater correlation between throughput and volume of exchange than between throughput and area.

Depth of the exchange bed is determined by the quantity and nature of the ions to be removed and the length of operating cycle desired. Seldom is bed depth under 30 in. For non-water applications especially, bed depth is usually greater than this. From 50 to 100 percent freeboard rising space is provided above the exchanger bed. During backwashing the bed is suspended by the upflow of wash water, and adequate space must be provided so that the exchanger does not carry over with the wash liquor. Siliceous exchangers, having a high specific gravity, require only about 50 percent freeboard, while resinous materials, especially the low-specific gravity anion exchangers, require a space equal to the original bed volume.

Because of practical limits for size of individual units, large capacities are usually handled by multiple units. Where desired throughput is large and mineral content is low (as in water demineralization) it is possible to run a number of units in parallel. On the other hand, where mineral content is high, the bed depth reaches practical limits, and it is necessary to run two units or more in series. This is common practice in deionizing sugar juices.

Corrosion-resistant construction materials are widely used in this equipment. Practically all equipment, other than that used in water softening, must be able to withstand corrosion. Where demineralization, hydrogen ion exchange, or anion exchange takes place, rubber lined steel equipment is used. For gravity-flow units, wood tanks with rubber-lined

Ion Exchange May Be Substituted for Present Day Methods



PROFITS from beet sugar industry increase with the substitution of ion exchange for straight house operation.

steel pipe and fittings are often used.

It is the need for regenerating the exchanger bed periodically that has provided ion exchange operation with its biggest disadvantage. Although continuous throughput of liquor is accomplished by use of multiple beds so that one or more may be operating while others are regenerating, this system requires much floor space, many units and an excessive amount of piping, valves and control equipment. Efforts are being made to develop this into a continuous operation, but so far nothing has found its way except in the development laboratories.

APPLICATIONS

Water Treating

Although the synthetic exchange resins have made possible the use of ion exchange on a wide variety of processes, water treatment is still the biggest single application. Since ion exchange is applicable only to ionized solutions, it is natural that water treating technics were developed first. These methods have been used in other applications with more or less minor modifications to meet individual requirements. Several basic hookups have been developed to produce a quality of treated water for almost any purpose.

Original application of ion exchange on a commercial scale was the use of zeolite to remove Ca and Mg (hardness) from boiler feedwater. This is still widely used in industrial water softening. However, both carbonaceous zeolites and synthetic resins, with their superior qualities of higher capacity and greater pH range, are capable of better performance and their use is growing rapidly. Where softening alone is desired, the cation exchanger is operated in the sodium cycle and the bed regenerated with salt. Here the total solids in the water is not reducible, and the water still reacts alkaline.

Operating in the hydrogen cycle, an acid regenerated cation exchanger removes calcium, magnesium, sodium, and iron while converting the chlorides, sulphates, nitrates and carbonates to their acid derivatives. Effluent then reacts acid to the extent of the hydrogen ions required to replace the metallic ions. Acids thus formed can be neutralized sufficiently by (1) blending with raw water, (2) by the so-called "split stream" method of blending with water softened in the sodium cycle or (3) by removing the acids in an anion exchange cell. Where carbon dioxide is objectionable, it is necessary to remove the CO_2 (from the carbonic acid) in a degasifier.

Split-Stream

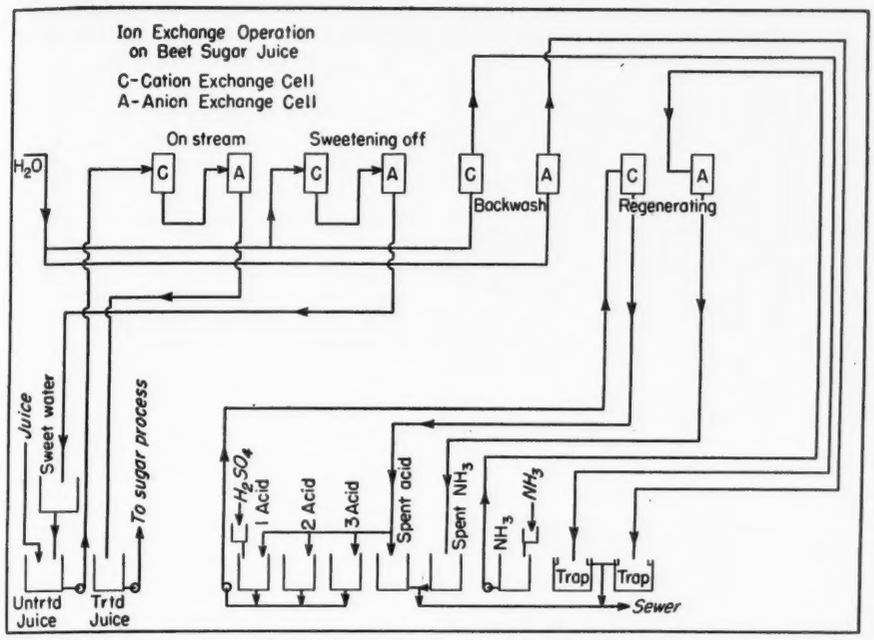
Blending raw water with the effluent from the hydrogen cycle cation exchanger provides a reduced alkalinity water which contains some hardness. The split stream system results in a neutral completely softened water. Complete deionization, however, produces a water that is the chemical equivalent of distilled water. Where water of this quality is required, demineralization is invaluable. Since more and more industries are finding it desirable to use better process water, deionization already has become well established in many fields such as fine chemicals, pharmaceuticals, beverages and dyes.

Cost of deionized water is markedly less than that of distilled water. Distillation units operate at a more or less fixed cost per gallon, regardless of the quality of the feed. On the other hand, the cost of deionization varies with the amount of material to be removed. Water can be deionized from a few cents to 25 or 30c per 1,000 gal., depending on the mineral content. This is but a fraction of the cost of distillation.

Silica Removal

Most significant development in water treatment is the removal of silica by ion exchange. Silica content of most water is low and except in boiler feed-water is of little significance. Ordinary deionization does not affect silica because it is practically nonionized. To accomplish silica removal by deionization, sodium fluoride is added to the raw feed entering the cation exchanger and is converted to hydrofluoric acid. This reacts immediately with the silica to form fluosilicic acid which is subsequently adsorbed by the anion resin. A final concentration of silica as low as 0.5 p.p.m. SiO_2 can be accomplished. With this method, it is necessary to modify the ordinary backwash and regenerating procedure. The anion exchanger must be rinsed with acid to flush out residual fluosilicic acid before regenerating with caustic, since the regenerating treatment would precipitate silica on the bed with subsequent clogging. Costs of silica removal by this process are said to be higher than by the old conventional methods. Various modifications of this process also may be used. A number of plants are now under construction, or are contem-

Beet Sugar Industry Finds Use for Ion Exchange



FLOW SHEET shows operations for purifying beet sugar juice utilizing ion exchangers.

plated, to provide silica-free boiler-feed water in capacities up to nearly 3,000,000 gal. per day.

Deionizing Sugar Solutions

Basic technology of deionizing sugar solutions and water is the same. But the problems of operation are vastly different. Dissolved solids in water seldom exceed 7.0 milliquavalents per liter, but the impurities in sugar beet juice after carbonation run from 35 to 75 milliquivalents per liter and in raw juice from 80 to 100. Thus, although it is not uncommon to deionize 500 to 2,000 gal. of water per cycle per cu. ft. of each ion exchanger, it is possible to treat only 50 to 150 gal. of sugar juice under the same conditions because of the high concentration of impurities.

Obviously, for a given throughput, sugar juice treatment requires larger equipment and shorter cycles than does water. In general, the cycles followed for sugar with four pairs of cells are ½ to 1½ hr. on-stream and 1½ to 3 hr. for washing and regeneration.

Since all sugar solutions must be concentrated by evaporation, it is necessary to prevent undue dilution. When the exchange cells go on-stream, the voids between the resin particles of the bed are filled with water. About 70 percent of this water is displaced by the sugar liquor without intermixing. The remaining 30 percent mixes with the sugar juice, but since it is quite dilute, it is returned as sweet water for reprocessing. This part of the cycle is known as "sweetening on." Upon exhaustion, when the units are taken off-stream, they are "sweetened-off" in a similar manner.

It is necessary also to take into account the water or juice in the space above the bed. Various arrangements may be used to keep this to a minimum, wherein the liquid level in the cells during all operations except backwashing is maintained within a few inches from the surface of the exchanger bed. In addition to lowering dilution losses, this system decreases the rinse water requirements. Level control such as this can be used advantageously in any process where maximum concentration of products is desired.

Another factor which complicates the process and adds to the cost is the removal of proteins, gums, and various nitrogenous tarry materials which adhere to the surface of the resins. When ordinary backwashing fails to remove these, it sometimes is necessary to apply a caustic backwash. Where resins are not adversely affected, it may be possible to backwash with hot water.

Of great concern to the manufacturers of crystalline sugar, but of no importance to the liquid sugar or sirup producers, is the tendency toward excessive inversion. Acid conditions of the cation cell are principally to blame for decreasing the sucrose content by inversion. One way to minimize this is to operate the process at high throughput rates to lower the time that the solution is in the acid condition. As soon as it reaches the anion cell, the acid is removed and no further inversion will occur. A disadvantage of operating two or more pairs of cells in series is that the increased time under acid conditions adds to the inversion loss. When normal operating temperatures are below 77 deg. F., further lowering of the temperature helps to minimize inversion.

Major operating cost is for regenerants. Approximately 15–25 lb. of 66 deg. Bé. sulphuric acid per ton of beets is required, and about 5–10 lb. of anhydrous ammonia (or the equivalent amount of other alkali) per ton of beets is needed to regenerate the anion exchanger. For a plant processing 2,000 tons of beets per day over a campaign of 100 days, this might amount to 500 tons of anhydrous ammonia and 2,500 tons of sulphuric acid.

Sulphuric acid is used in preference to hydrochloric or nitric because of price. One difficulty in using sulphuric acid is that, when the cation exchange resin contains a large quantity of calcium ions, the reaction with the acid precipitates calcium sulphate which is sometimes hard to rinse off. When this happens, washing with a salt solution is desirable to remove the calcium before regenerating with sulphuric acid.

Although caustic soda, soda ash or ammonia may be used for regenerating the anion exchanger, the use of ammonia is often preferred because it rinses out more easily and is slightly cheaper to use.

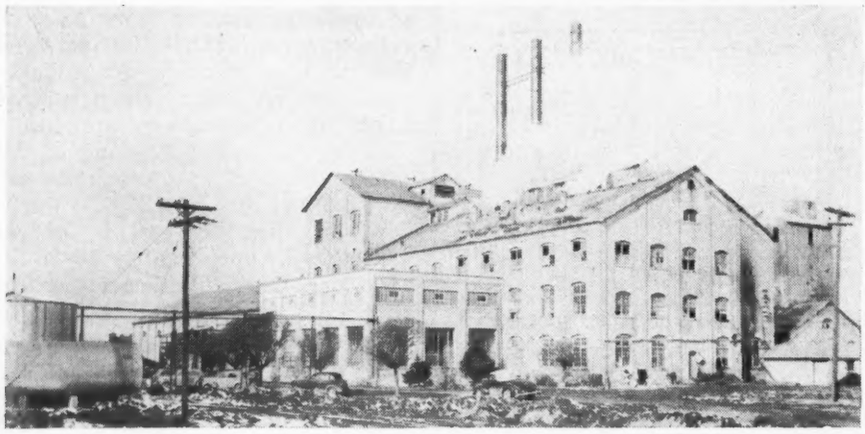
Since it takes about 1 cu. ft. of each exchange resin per ton of daily capacity, the total resin charge for a plant processing 2,000 tons of beets per day would be about 2,000 cu. ft. each, or a total of 4,000 cu. ft. Due to operation losses such as attrition and backwash carryover, which amount to as much as 15 percent per operating season or campaign, it is necessary to add about 300 cu. ft. of each resin to make up for these losses.

Sugar Processes

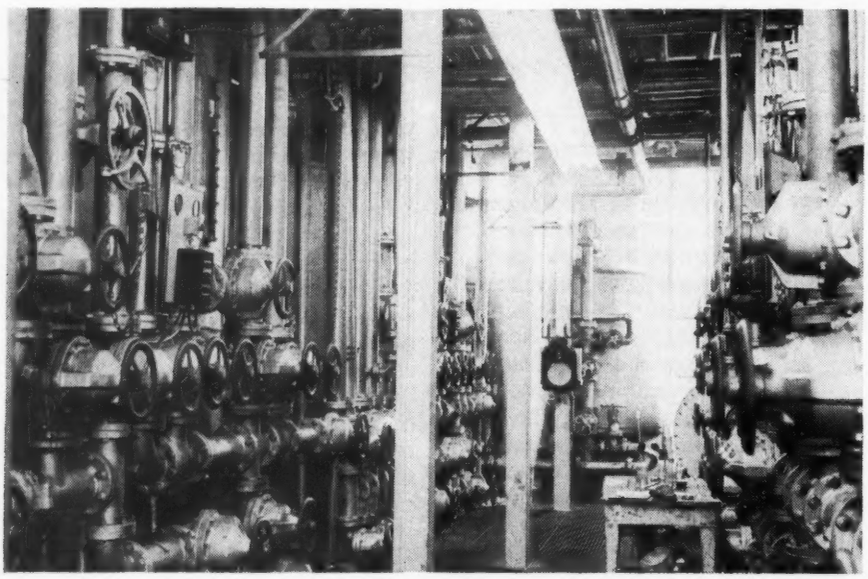
Sugar refining is comprised of two main types of operations. The first is a series of steps to remove a maximum amount of dissolved non-sugar solids. The second involves the separation of maximum yields of pure sugar from the remaining dissolved impurities by evaporation and crystallization. The success of the second step is dependent on the first, since the major factor limiting the crystallization of sugar is the presence of non-sugar solids in the solution.

Commercially refined sugar is about 99.98 percent pure, but the

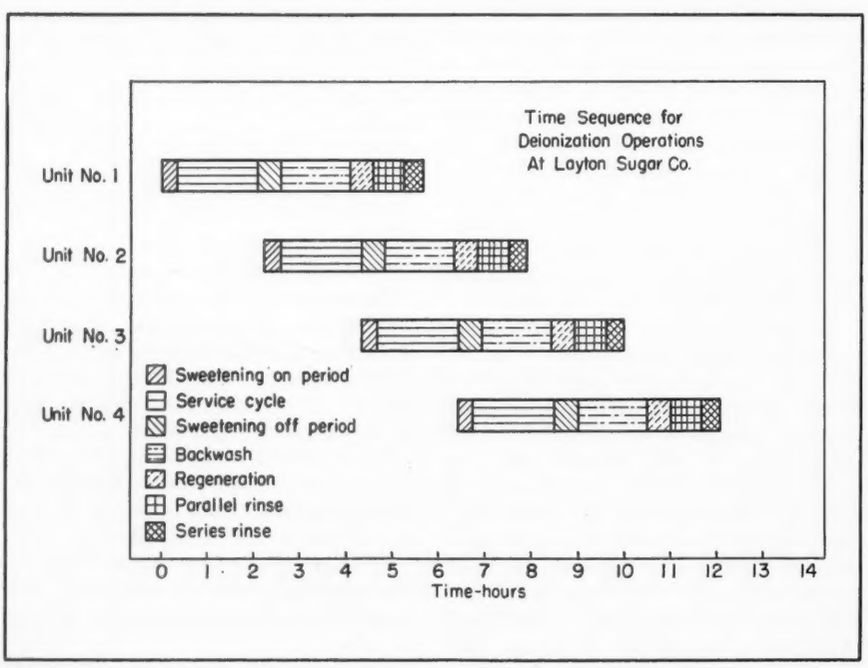
New I. E. Installation at Layton Sugar Company



NEW ion exchange plant was operated by Layton Sugar Co. for most of 1947-48 season. Tanks shown, at left, are for regenerant solutions used on beds.



PLANT was designed to treat juice from 1,350 tons of beets daily. The four pairs of cells are controlled manually from operating floor during processing.



SEQUENCE of operation for four pairs of cells at Layton's sugar plant.

residual molasses is inedible because a bad taste is imparted by non-sugars, such as mineral ash, organic nitrogen compounds such as protein, and organic acids. According to sugar men, about 1 lb. of lime restrains about 2½ lb. of sugar from crystallizing and 1 lb. of potash restrains about 4 lb. of sugar. With present standard methods of purifying sugar juice, both cane and beet (straight house), it is possible to obtain juice approximately 90 percent pure and to recover 83½ to 85 percent as pure sugar.

With the ion exchange process, however, it is possible to remove a greater proportion of these non-sugars to produce a juice of 96½ to 98½ percent purity. This means the recovery as white sugar of 95 percent or more of the total sugars. In addition, the remaining molasses is a pleasant-tasting edible sirup that can be marketed as such. Important from the operating standpoint, the removal of scale-forming substances like calcium improves heat transfer by eliminating scaling of equipment.

Although the primary purpose of deionization is to remove mineral electrolytes, it has been found that this treatment can remove from 60 to 90 percent of the organic non-sugar solids. Colloidal material and various other substances which affect taste, odor and color are removed to some extent. There is a strong possibility that some of these non-sugar fractions of the sugar juice, such as amino acids, which become concentrated on the exchange resin, can be recovered from the spent regenerant solution.

Increased yields and improved quality sirups, during the period of sugar shortage, have been incentive enough for the sugar industry to develop this new refining technic. But, in the long run, the real value of ion exchange will be in doing a better job cheaper. This can be accomplished only by supplanting and eliminating some of the present process steps.

Beet Sugar

Ion exchange units have been used in the beet sugar industry to treat the juice at various points in the refining process. Most desirable, economically, would be to deionize diffusion juice directly and then pass it to the evaporators. This would eliminate the carbonation and sulphitation steps and would save materials and labor. Use of ion exchange should eliminate the need for Steffens house treatment where sugar is recovered from straight house molasses. However, in the face of

all this work, additional Steffens house facilities are still being planned.

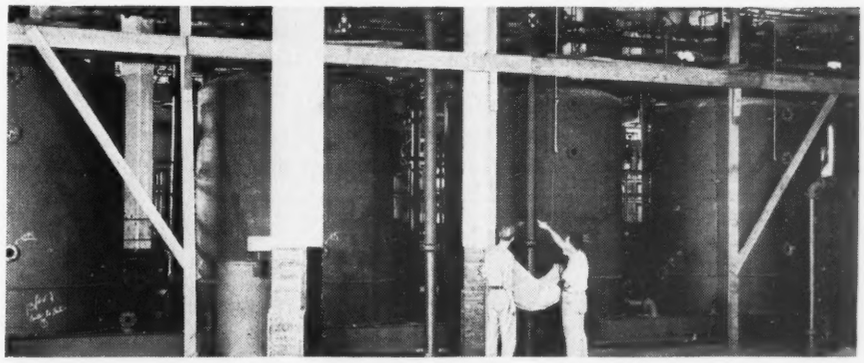
Although designed and built by different firms, all beet sugar installations, so far, are similar. Four pairs of cells are used and tanks, piping and valves are rubber lined to protect them from corrosion. Common to all units is a set of regenerating tanks with controls for refilling and diluting the regenerants. Recording conductivity and pH meters determine when the exchange beds reach exhaustion. Control of operation may be manual, partly automatic or completely automatic.

Size of the units depends upon a number of factors, the most important being the throughput desired and the time each unit must be on-stream before regenerating. For a given throughput, short cycles permit the use of smaller equipment than if long operating cycles are employed. An important factor is whether the operation control is manual or automatic. When manual control is practiced, the operating cycles must be long enough to allow the operator sufficient time to manipulate the units efficiently. On the other hand, where the units are automatically controlled, operation on a much shorter cycle is possible.

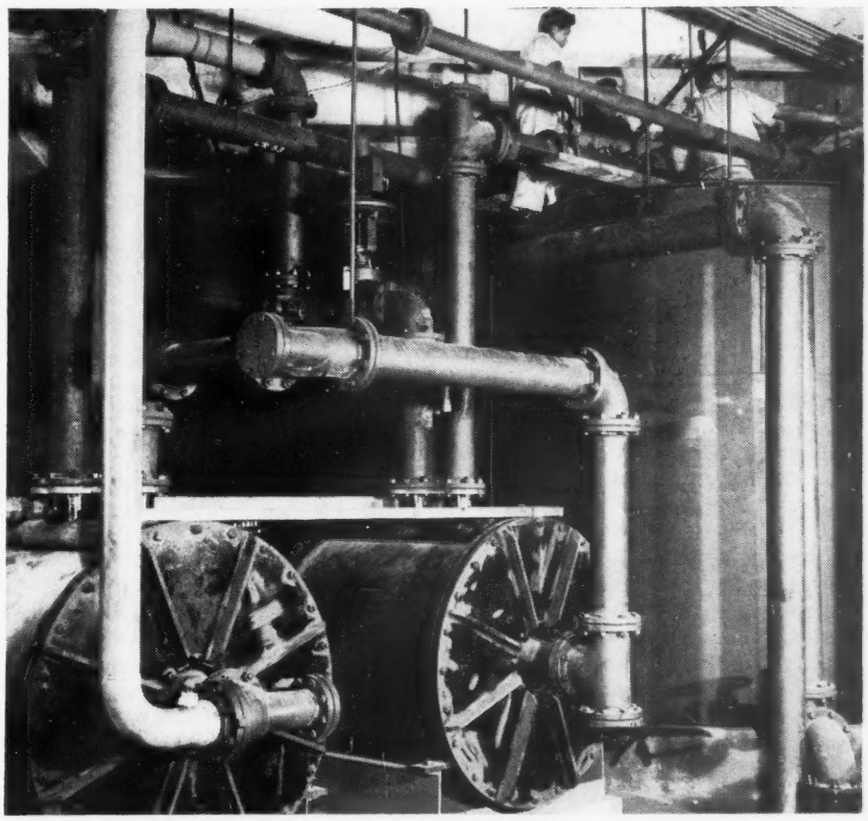
Experimental work was underway before the war, but the first commercial size unit was put in operation in 1941, at the Isabella Sugar Co., Mt. Pleasant, Mich. This unit was in service for two seasons. It was then dropped because the high price for molasses offset the advantage of greater sugar recovery. The plant was used again in 1946 by the Pepsi-Cola Co. for recovering sugar sirup from blackstrap molasses. Present design has outmoded the open-tank gravity-feed cells used in this initial plant.

Since 1941, great strides have been made in developing ion exchange into a successful sugar process. Pilot plants were built and operated by a number of companies. As a result of extensive pilot plant work at Burley and at Nampa, Idaho, the Amalgamated Sugar Co. constructed a full scale plant at Twin Falls, Idaho. Holly Sugar Co. operated a large pilot plant at Alvaredo, Calif., before deciding to go ahead with its commercial-size unit at Hardin, Mont. A third plant, the result of extensive pilot studies, was built by Layton Sugar Co., Layton, Utah. Another plant, on a somewhat smaller scale, was installed by the Utah-Idaho Sugar Co. at West Jordan, Utah. Union Sugar Co. of Bettervia, Calif., has operated pilot plants, and practically every other sugar processing

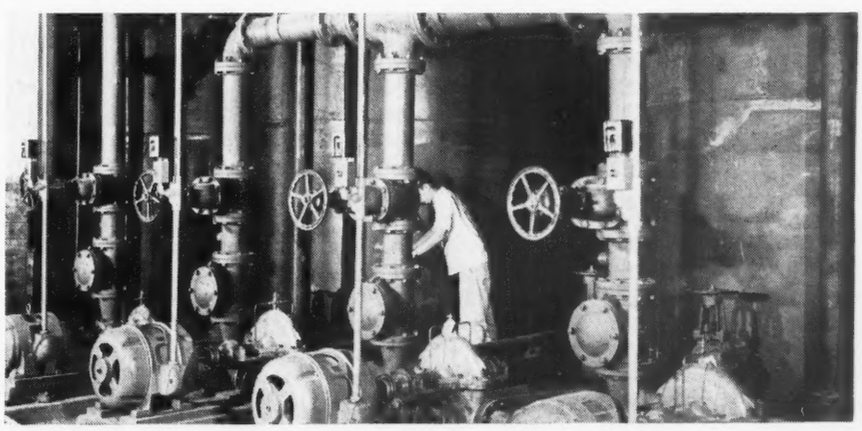
Many Different Types of Equipment Are Used



SUGAR sirup, containing more than 4,000 tons of sugar is recovered annually from waste pineapple juice at the Hawaiian Pineapple Co.'s new exchange plant.

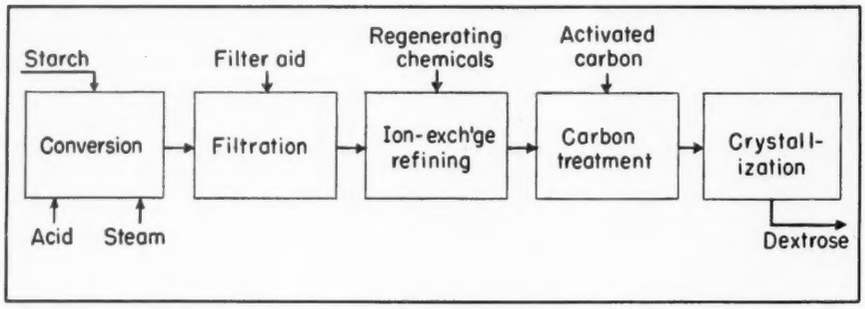


FIRST step in process is cooling the raw juice in heat exchangers before pumping it through the ion exchange beds for sugar recovery form the waste product.

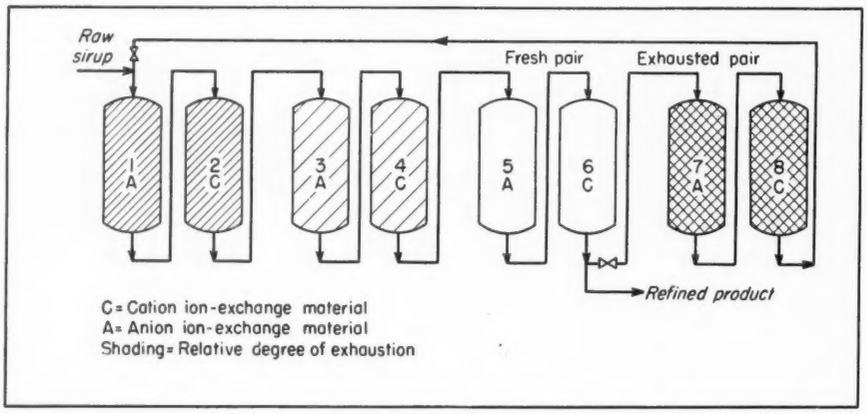


REGENERATION of exhausted cells is accomplished by pumping sulphuric acid through the cation bed and caustic soda through the anion bed.

Schematic Shows I. E. in Dextrose Processing



MANUFACTURE of dextrose uses ion exchange in processing corn sugar to improve color and flavor and to reduce substantially the ash content.



USUAL operating procedure is reversed: Raw liquor is passed first through anion cell, which neutralizes partially acidity acquired during conversion.

concern has carried out experimental work.

Until recently, the only appraisals of ion exchange in beet sugar have been made from pilot-plant runs or from relatively short runs of full-scale plant equipment. However, during the 1947–48 season, Holly's Hardin plant operated about 22 days, Layton Sugar Co.'s plant was in service for almost the entire season, and Amalgamated's ion exchange unit at Twin Falls did not get into operation. Information available now makes a more realistic evaluation of the process possible.

So far, the only plant that has reported on full-scale operation is that of Layton Sugar Co. This ion exchange plant was designed to handle the juice from 1,350 tons of beets per day, with manual control of the operation. Each of the four cation cells was 10 x 14 ft. with an 8-ft. bed of resin, and the anion cells were 10 x 11 ft. with a 5½-ft. bed. Each unit was on-stream 1¾ hr. and was then sweetened-off, backwashed, regenerated, rinsed and sweetened-on over a period of 3½ hr.

Results of the operation can be shown by some figures that were averaged from several hundred determinations: Brix of influent juice, 12.95; Brix of effluent juice, 11.81; percent sugar in influent juice, 12.13; percent sugar in effluent juice, 11.61; percent influent juice purity, 93.76; percent effluent juice purity, 98.60; pH of influent, 8.14; pH of effluent, 7.13; percent invert influent, 0.13; percent invert effluent, 0.39. Overall dilution was 4.28 percent. Unknown sugar losses increased 0.24 percent. Purity rise figures indicate a non-sugar removal of 77.56 percent. Average total extraction of sugar was 92.03 percent in comparison with 85 percent to be expected on straight house operation. Regenerant consumption for the campaign averaged 20.44 lb. of 66 deg. Bé. sulphuric acid and 11.81 lb. of anhydrous ammonia per ton of beets processed. Ash determination on sugar from deionized juice showed results of from 0.006 to 0.008 percent, compared with 0.025 to 0.030 percent for straight house sugar.

Generally, the operation confirmed pilot plant results. However, several points are worthy of comment. It was found advantageous, for example, to backwash with hot water, rather than with cold as is normally the case. Hot water will loosen and remove more easily certain waxy and gelatinous materials that cling to resins. When this practice is used, however, resins that will not be damaged by hot water must be selected.

After a month of operation, or about midway in the campaign, a decrease was noted in anion capacity. Experimental studies indicated that this loss in capacity was not due to destruction of the resin but more to the cumulative effect of trace organic compounds in the juice attaching themselves to the resin and masking its active exchange ions from weaker organic acids. Further work indicated that treatment with a strong reducing agent would remove these substances and restore the resin to its original capacity.

The effect of bacteria growth in the resin beds was noted also. Tests were made after about 6 weeks of operation by sampling the resins, juice and wash liquors and submitting them to a bacteria study. Results are summarized in the accompanying table. It is apparent that, though the juice was heavily contaminated when it entered the ion exchange system, it was relatively free of objectionable contamination when leaving the system.

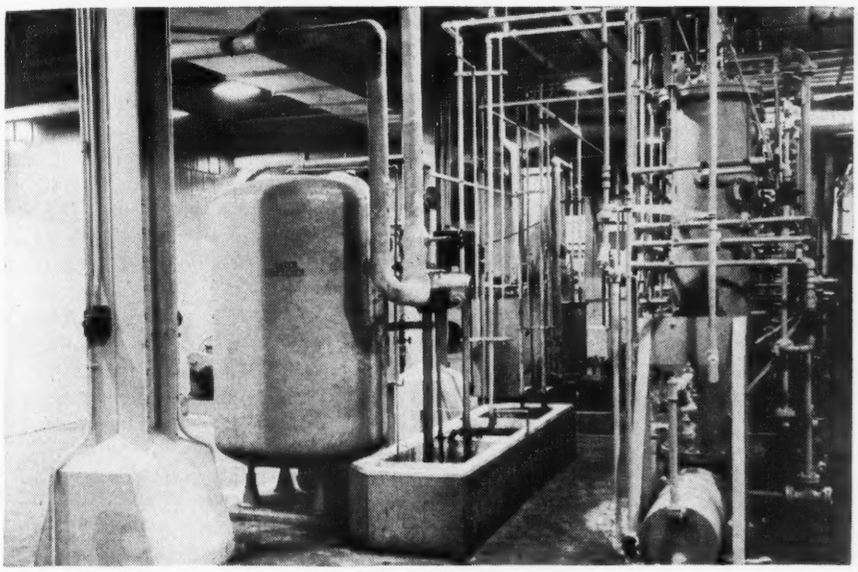
Certain benefits resulted from deionization, such as elimination of shutdowns for boiling-out the evaporators and pans, obviating the removal of evaporator tubes at the end of the season and increased efficiency with clean scale-free heating surfaces.

Until this time, little consideration had been given to the fact that subsequent operations in the refining process might be affected by the changed purity characteristics of the juice delivered by the deionization unit. Not until the full throughput of the plant was in the pure deionized form was it evident that the normal methods of boiling and crystallization would have to be modified to take full advantage of this new juice purity. Although several operating changes are planned at the Layton plant to meet this situation, full recognition and analysis of the problems involved will probably not be forthcoming until more data are available.

Cane Sugar

Although considerable experimental work has been done on use of ion exchange in cane sugar operations, no commercial-scale installations have been made. Pilot plant work has been carried out at a number of sugar plants, including: Godchaux Sugars, Raceland, La.; Manati Sugar Co., Cuba; Pepsi Cola Co., Central Espana, Cuba; Audubon Sugar Factory, Louisiana State University;

I. E. Has Been Tested in Pilot Plant Stations



ACCESSORY equipment such as pumps, valves and piping is needed.

United States Sugar Co., Clewiston, Fla.; and the Hawaiian Sugar Planters Assoc.

Experimental work indicates that the use of a deionization system may well simplify cane sugar processes. Cane juice is deionized before being evaporated so that white sugar can be crystallized directly in a manner similar to the beet sugar processes. This would eliminate the raw-sugar step, would produce an edible sirup instead of blackstrap molasses and would increase the yields of sugar. Advantages from such process improvements, however, must be balanced against the economic structure of the cane sugar industry. Under normal conditions, the high tariffs leave little incentive for producers outside the continental U. S. Should Hawaii achieve statehood, refined cane sugar would probably be produced on the islands and shipped direct to consumers on the mainland.

Utilization of the ion exchange process in refining raw sugar has been studied, but has not been adopted on a commercial scale.

But there does seem to be economic justification for using deionization in producing liquid sugar from either molasses or raw sugar. Valentine Sugars, Lockport, La., has installed an ion exchange system for producing edible sirup from molasses.

Since liquid sugar is desirable for use in manufacturing many food products, the location of such plants near the point of consumption may be economically feasible. This would eliminate the freight charges on the water content of liquid sugar and should be less expensive than making sirup direct from refined sugar.

Waste Fruit Juices

Recovery of natural sugar from nonpotable fruit juices was responsible for two commercial-scale installations last year. The first of these to go into operation is that of Citrus Concentrates, Inc., Dunedin, Fla., which was designed to treat 25,000 gal. per day. The juice is pressed from orange or grapefruit peel and then processed, ion exchange being used to recover the sugar as sirup. A second plant, that of the Hawaiian Pineapple Co., Honolulu, started operation in the summer of 1947. This plant was designed to process up to 300,000 gal. of waste pineapple juice per day and to recover annually over 4,000 tons of sugar in the form of sirup.

Formerly, the waste juice was processed to recover citric acid and then concentrated for use as cattle feed. Now, after the citric acid is removed by precipitation and filtration, the juice is deionized, concentrated and used in canning operations.

The Hawaiian Pineapple Co.'s plant uses five pairs of cells (one cation and one anion cell to a pair) and has automatic push-button control. Juice is passed through two units in series, with each unit in service for one hour. When an exhausted unit is taken off-stream, the fresh unit is placed in service, so the raw juice goes through the partially exhausted cells first and is finished in the fresh cells. Sulphuric acid and caustic soda are used for regeneration. Caustic soda was selected, rather than ammonia or other possible anion regenerants, on the basis of cost and availability.

Corn Sugar

Ion exchange treatment is substantially the same for refining all types of sugar: beet, fruit, cane or corn. Corn Products Refining Co., Argo, Ill. has operated a large pilot plant* for more than a year. A. E. Staley Co., is reported to have carried on similar experimental work. Results of pilot-plant operation were such that Corn Products has included a large scale completely automatic ion exchange system in plans for its new plant in Corpus Christi, Tex. This plant will process 20,000 bu. of milo maize per day to produce dextrose and other corn products.

Manufacture of dextrose consists of converting corn starch by treating with acid at high temperature. Soda ash is added, after conversion, to neutralize the acid. Solid impurities are filtered off. The liquor is passed through bone char or activated carbon, and the resulting clear liquor is evaporated and crystallized, as in the production of beet or cane sugar.

In the pilot work, an ion exchange system was used in place of the soda ash neutralization and bone char refining. The results of deionizing the corn sugar liquor show improved color and flavor and a substantial reduction of ash content in the final product.

Four ion exchange units were used: that is, four cation and four anion cells. Triple-pass countercurrent operation was followed. The liquor passed through three units in series while the the remaining pair was regenerating. This is similar to the system used in recovering sugar

DEGREE OF CONTAMINATION of Resin Beds After Six Weeks' Operation.

	Flat Sours	Total Thermophiles	Total Bacteria 37 deg. C.	Molds
Cation resin end of run	0	Innumerable	Innumerable	200
Anion resin end of run	90	165	Innumerable	125
Treated juice first of run	0	5	620	0
Treated juice end of run	0	0	925	0
Influent to heat exchangers	425	425	22,500	10
Effluent to heat-exchangers	2,260	2,260	Innumerable	0
Cation backwash	6,250	6,250	Innumerable	0
Anion backwash	0	0	210	0

No yeast spores were found at any point in the process.

This table is reproduced from paper "De-ionization and Beet Sugar Production at the Layton Sugar Co." by Lyle B. Porter, Director of Research, Illinois Water Treatment Co.

*A complete report on the pilot plant operation was presented at the Detroit A.I.Ch.E Meeting, Nov. 9-12, and will be published in more detail in a forthcoming issue of *Chemical Engineering Progress*.

from waste fruit juices. The exhausted pair of cells was taken offstream, the fresh regenerated unit was placed in the No. 3 position and the liquor entered the unit formerly in the No. 2 position. Thus the raw sirup always entered the most exhausted unit and finished in the most recently regenerated unit.

Regeneration was carried on in a normal manner after sweetening-off. Cation beds were regenerated with a 2 percent sulphuric acid solution, the anion beds with a 4 percent solution of sodium carbonate (soda ash).

Soon after the unit went into operation, the discovery was made that the partially exhausted resin in the first cation cell was being regenerated by the acidified raw feed liquor which has a pH of below 2.0. Impurities were added to the liquor and a greater load was placed in the remaining two cation cells. By a reversal of the usual order and the placing of the anion exchange cell in the leading position, this problem was overcome. The anion cell reduced the acid content of the liquor until the pH of the liquor was higher than that of the cation exchange resin.

Dairy Industry

There has been considerable investigation of ion exchange applications in the dairy industry. To date, commercial applications have been only on a small scale, but they help to illustrate the many types of jobs that ion exchange systems can accomplish.

The M & R Dietetic Laboratories, Detroit, Mich., passes milk through a cation exchanger to reduce the calcium content. Calcium in the milk is replaced with sodium to produce a highly digestible product for use in infant feeding. This is, of course, a base exchange process similar to that used in softening water.

Another dairy application stems from the fact that evaporated milk is unstable without proper balance between calcium and magnesium ions on one hand and citrates and phosphate on the other. Where calcium and magnesium concentration is too high, small amounts of stabilizing salts such as disodium phosphate are customarily added to balance the system and control the heat stability of the product.

Since the correction of the salt equilibrium is in most milks slight, salt balance can be maintained by removing calcium from a small portion of the total milk treated, by using a cation exchange process. About 60 percent of the calcium is removed by passage of the milk through the cation exchanger. Treating from ½ to 2 percent of the milk throughput stabilizes evaporated milk effectively against coagulation during sterilization. The calcium is removed by use of a resinous cation exchanger operating in the hydrogen cycle.

Pilot plant studies have been made also on deionizing whey in the recovery of lactose or milk sugar. Removal of minerals and salts aids crystallization and improves yields.

Use of ion exchange resins in analytical work for determining traces of copper in powdered or fluid milk has been studied. The copper is made available by reducing the milk pH with perchloric acid and concentrating by a cation exchange resin in the hydrogen cycle. The copper is recovered with dilute hydrochloric acid and is analyzed polarographically.

Pectin Recovery

A successful application of ion exchange is carried out by the Universal Colloid Corp., McAllen, Tex., in preparing pectin from grapefruit waste. A cation exchanger operating in the hydrogen cycle is used to remove mineral impurities.

Grapefruit peel is ground and washed to remove soluble impurities. It is mixed with a cation exchanger and extracted for 1 hr. at 196 deg. F. The exchange material takes up the calcium and magnesium, lowers the pH and frees the pectin to solution. Exchanger and peel are separated in a centrifugal, the pectin solution going directly to evaporators and driers after being mixed with sugars. The exhausted exchanger and the grapefruit waste are further separated by screening and backwashing. The exchange material is regenerated with sulphuric acid for reuse. A higher grade pectin is obtained with greater yield than by some conventional processes.

Tartrate Recovery

Pilot plant work on the recovery of tartrates from winery waste, using anion exchange, has been conducted by Western Regional Research Laboratories, Albany, Calif. Waste liquors containing tartrates are passed through a bed of anion exchange material exhausted with hydrochloric acid. The tartrate anions were exchanged for chloride ions, and, after exhaustion, the tartrates were recovered from the anion exchanger as the sodium salt by passing concentrated brine through the bed. The salt solution was limed to form crude calcium tartrate.

Another process has been developed to recover tartrate from winery waste. The raw material in this case an extract of pomace (skins, seeds and stems of grapes)—is passed through a three-stage ion exchange system. The first unit contains a bed of anion exchanger which removes free acid in the potassium tartrate solution. Effluent from this unit, containing potassium tartrate, is passed through a cation exchanger bed. Potassium ions are here exchanged for hydrogen ions to form tartaric acid, which is removed by another anion exchange unit. After exhaustion, the first anion exchange bed is treated with 15 percent sulphuric acid, displacing the tartaric acid. The other anion exchange bed is treated with 10 percent potassium hydroxide, forming potassium tartrate. These two tartrate solutions are decolorized, blended and cooled, precipitating large white potassium acid tartrate crystals.

Resin Manufacturers

Manufacturers of synthetic resinous ion exchangers include the following: American Cyanamid Co., New York, N. Y.; Chemical Process Co., San Francisco, Calif.; Dow Chemical Co., Midland, Mich; Permutit Co., New York, N. Y.; Resinous Products and Chemical Co., Philadelphia, Pa. This list may not be complete, but it represents the major concerns which have made present advances possible by developing and improving ion exchange materials. It does not include several companies which make only zeolites for water softening. Some of the esin manufacturers do not market their products themselves. Dow Chemical Co., for example, markets its resins through the National Aluminate Co. Chemical Process Co., for the most part, markets its resins through equipment suppliers.

Equipment Builders

Major concerns that design and build ion exchange systems are: American Cyanamid Co., New York, N.Y.; Cochrane Corp., Philadelphia, Pa., Dorr Co., New York, N. Y.; Illinois Water Treatment Co., Rockford, Ill.; Infilco Inc., Chicago, Ill.; Liquid Conditioning Corp., Linden, N. J.; Permutit Co., New York, N. Y. This list is by no means complete, since there are a number of companies that build units only for water treating and for special purposes, (such as Barnstead Still & Sterilizer Co.) Some of the above companies manufacture resins themselves and others may purchase the resins and market them under an individual brand name. Still others refer the prospective user direct to the resin manufacturer.

Winter Wheat Field Reports Cast Some Doubt On Crop

Heavy spring moisture and good weather may not be enough to overcome poor sowing conditions in the big producing areas

By E. S. STATELER, Associate Editor, "Food Industries", Chicago

CROP conditions throughout the hard winter wheat areas of Nebraska, Kansas, Colorado, Oklahoma, Texas and New Mexico are so different this year from those of the past 30 or more years, that wheat production for 1948 can not yet be forecast with any reasonable degree of accuracy. These are the areas in which the greatest acreages are planted and from which are harvested more than 400,000,000 bu. of the total United States wheat crop of approximately 1,100,000,000 bu. Of this total, approximately 800,000,000 bu. is winter wheat.

Drought conditions of last summer and fall, late planting, shallow rooting, deep freezing and heavy volunteer growth are adverse factors and would usually indicate a very poor harvest. This year, the precipitation from December 1 to March 15, in the form of rain and snow, is reported to be the heaviest in 50 years. The heavy blankets of snow during February and March have been the most favorable factors in a promising wheat crop providing subsequent precipitation and temperatures continue favorable for wheat growth and maturity without the development of red rust or excessive vegetative growth at the expense of head development and berry formation.

Field Reports

Field reports from various sections of the hard winter wheat areas are definitely bearish in contrast to the optimistic reports quoting USDA. In summary the field reports are:

1. Soils were extremely dry last fall. Much seeding was done in dry, dusty soil.

2. Volunteer wheat did not germinate until late with result that it could not be destroyed.

3. Wheat sowing and sprouting or emergence were late—as late as after December 1. Best seeding time is from September 15 to October 15.

4. Acreage planted is at least 1,000,000 acres less than reported by USDA, and some estimates are as high as 2,000,000 acres less.

5. Lack of subsoil moisture prevented development of vigorous root systems by wheat plant during fall and early winter even in areas where surface moisture was sufficient for sprouting.

6. Adverse weather conditions and frozen ground kept wheat plants from making appreciable growth from December 9 to March 15, on which date a heavy snow fell on thoroughly wet unfrozen fields, particularly in Kansas.

7. Stooling has been seriously retarded to give a light or thin vegetative growth except in areas where late volunteer growth is heavy. The thin growth of planted wheat is conducive to spring weed growth and the heavy volunteer growth overcrowds the fields with poor grain yield in both cases. Attempts may be made to control weed growth by spraying with 2, 4-D and to thin out the volunteer wheat growth by judicious harrowing. Neither gives any assurance that a good yield of grain will result.

Planting Abandoned

8. Winter kill and loss resulting from sprouting in ground too dry to sustain plant growth is estimated to be as much as 20 percent of the planted acreage or approximately 7,000,000 acres. In some areas as much as 50 percent of the planted acreage has been or is likely to be abandoned. Most conservative estimate of abandonment in the six-state area is 8 percent of seeded acreage; approximately 3,000,000 acres.

9. Crop conditions are best east of a line running north and south through the center of Kansas where crop conditions are as good if not better than normal for this time of year. West of that line conditions are the poorest in six years and only a miracle will produce as much as a 50 percent normal crop. Conditions in Kansas are as promising as in any of the six states. Most optimistic estimates put the likely 1948 crop at 150,000,000 bu. as compared with the average of approximately 200,000,000 during recent years. Some estimates have it as low as 50 percent of 1947 crop. Unusually favorable conditions during May and June will be necessary to attain the 150,000,000 bu. Oklahoma crop is expected to make only 8 to 10 bu. per acre at best.

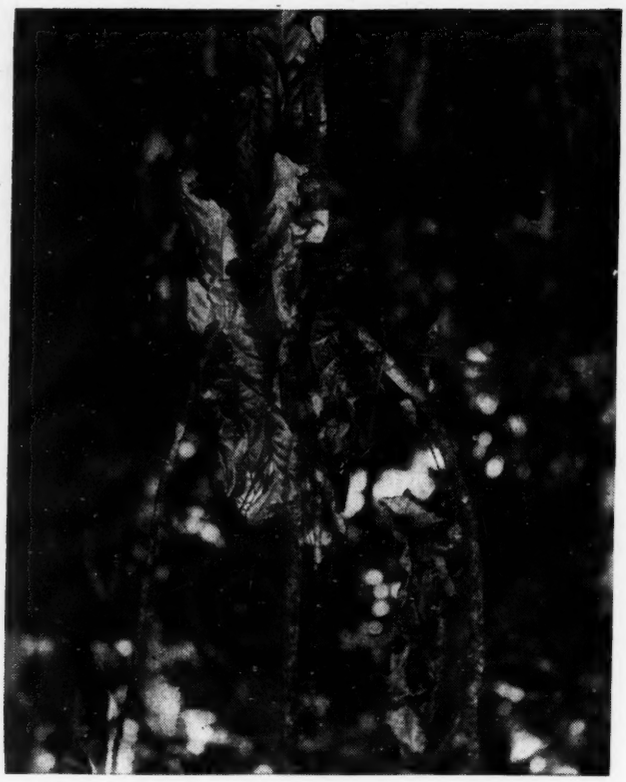
Excellent outlook is reported for the wheat crops in Missouri, Illinois, Indiana, Ohio and similar states, where winter wheat is grown on a less extensive scale than in the six hard winter wheat states.

10. An unusual adverse factor this year is the excessive amount of unrotted straw in the fields from the 1947 wheat crop. This condition results from the use of the "combine" harvester-thresher, which leaves all the straw on the field. Burning of this straw has decreased since the "Dust Bowl" days of the early 1930's until less than 1 percent of the 1947 acreage was burned. Although this unburned straw keeps down wind erosion of the soil it is cited to be a detriment to the production of a good wheat crop during the succeeding year.

Other Grains

The bearish outlook for a 1948 wheat crop brightens considerably the outlook for an overall grain crop including the sorghum grains. Winter rains and snows have soaked thoroughly the panhandle sections of Oklahoma and Texas, western Kansas and eastern Colorado.

Also, poor prospects for a winter wheat crop encourages heavier planting of spring wheat with the result that a light winter wheat harvest is often accompanied by a heavy spring wheat harvest. Whether such will be the case in 1948 remains to be seen. There is plenty of soil moisture in the spring wheat areas.



COCOA PODS are borne on trunks of cacao trees, are highly susceptible to disease. Tree at right was killed by capsids.

Cocoa Demand Goes Up

Wartime neglect, disease, drought and decline in fertility have

By VERNON McKAY, Research Associate,
Foreign Policy Association, New York

IT is certainly no secret in the confectionery industry that climbing costs of cocoa beans have played hob, not only with the five-cent bar, but with the price line in all candy products. Rising 823 percent between January, 1941 and October, 1947, the greater portion of the jump came after abolition of price controls, in October, 1946. Cocoa then followed other commodities in an upward boom. Philip P. Gott, head of the National Confectioners Association, attributes the tremendous increase to three main factors: The world shortage of cocoa beans, increased demand from the United States and other countries, and the monopolistic cocoa marketing systems of the British and Brazilian governments.

British West Africa and Brazil, according to the February report of the International Emergency Food Council, will export 396,600 long tons of the estimated world total of 591,550 tons of cocoa beans in the 1947-48 season. The Gold Coast and Nigeria, British colonies in West Africa, will produce 282,600 tons while Brazil's total will be 114,000. Other Latin American countries, chiefly the Dominican Republic, Venezuela and Ecuador, will total 85,930 tons. The figure for French West Africa is 66,650, and smaller quantities will be exported from a dozen other countries.

Who will buy the world's output of cocoa beans? Allocations for each country are determined by the International Emergency Food Council. By far the largest consumer will be the United States, which according to the new allocations will take about 43 percent of the total. The Hershey Chocolate Corp. alone has been buying about 100,000 tons a year. Other leading consumers are the United Kingdom 17 percent; France, 7.6 percent; the Netherlands, 5.2 percent; Canada, 3.2 percent; U.S.S.R., 3.0 percent.

Production

World production had reached a total of 725,000 tons by 1939. The fall to this year's level of less than 600,000 tons may be attributed to several factors. First of all, wartime neglect of cocoa farms reduced their output. This neglect was a natural result of the drop in price to five cents a pound in January, 1941. The price dropped because shortage of shipping space during the war prevented cocoa producing countries from exporting their crops.

A second important reason for the decline of production is the spread of disease. A British official recently warned that a virus disease, called swollen shoot, has become such a threat in the Gold Coast that the whole crop may be wiped out within 20 years unless adequate preventive measures are taken. This danger is reminiscent of the earlier destruction of Trinidad and Ecuador plantations by the South American Witch Broom disease.

Three recent years of drought in the Gold Coast have also diminished production. Finally the fertility of the soil on which cocoa trees are planted is declining in numerous areas. The spectacular expansion of cocoa production in the 20th century was usually accompanied by unscientific planting methods. Cocoa

SWOLLEN SHOOT will destroy 15,000 trees a year at present rate of spread. Plant (left) is infected, trees (right) dying.

Supply Comes Down

all contributed to West Africa's lowered production

is an exacting crop, which requires high humidity, high temperature, and well distributed rainfall. In many tropical areas, fertility is limited to the soil near the surface, which is enriched by a covering of forest growth. When the forest is removed to make way for cocoa trees, fertility declines.

British Controls

Many American cocoa buyers contend that the high price of cocoa is not entirely the result of short supplies and large demands. They believe that marketing control policies, particularly the buying monopoly of the British government in the Gold Coast and Nigeria since 1939, have boosted prices. British officials, emphatically denying this charge, attribute mounting prices to the law of supply and demand, and to the activities of speculators on the New York Cocoa Exchange.

To what extent are these charges and counter-charges true? The Gold Coast and Nigerian marketing boards are certainly in a position to influence the world price of cocoa, for they buy the entire crop from native farmers at a price that the boards themselves fix. Moreover, the fundamental aim of Britain's marketing controls is to protect the native producer—whose interests are sometimes likely to conflict with those of the consumer.

At the moment, however, it is impossible to prove that the price of cocoa would be lower if marketing controls did not exist. The Nigerian and Gold Coast boards sell at the prevailing world market price without attempting to withhold supplies in order to drive up the price. Whether they will always follow this policy remains to be seen. Meanwhile, speculators on the New York Cocoa Exchange, as on all commodity exchanges, are influencing the price. In the banner year 1936–37, for example, the United States consumed 232,000 tons of cocoa beans, but 1,808,022 tons were bought and sold on the New York Exchange which, in effect, sets the world market price.

The United States normally gets half its cocoa from the Gold Coast, which exported 300,000 tons in its peak year. Gold Coast cocoa production is an agricultural industry almost unique in the world for it started only 70 years ago. It began and remains in the hands of small, independent, native farmers. As late as 1905, West Africa produced only 4 percent of the world's exports, but by 1925 the Gold Coast alone contributed nearly 44 percent. According to prewar surveys, the Gold Coast contains about 300,000 cocoa farms averaging 2½ acres in size. Unlike the organized plantations of South America and the West Indies, the West African industry grew up as a cash crop accessory to subsistence agriculture.

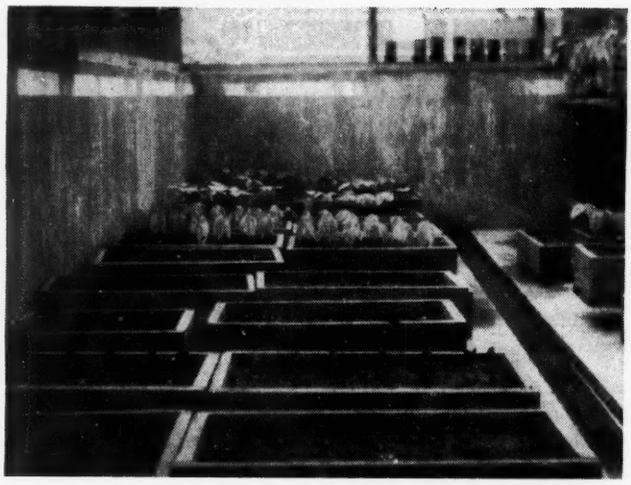
Raising Standards

Practices that are common on a well-conducted plantation — draining, pruning, manuring and pest control—are seldom followed by Gold Coast farmers. In fact, early Gold Coast cocoa was neither fermented nor properly dried. Efforts by the Department of Agriculture and the European buying firms, however, have raised standards today. In 1934 compulsory cocoa grading was inaugurated by law, and the export of cocoa below a certain standard of purity was prohibited.

The cocoa crop comes in pods at-

Research Is the Main Hope For Increased Cocoa Production

THE INSTITUTE, in order to attract native workers, has provided housing facilities close to its laboratories.



STUDIES being made by the West African Cocoa Research Institute offer hope of solutions to the many problems.

tached by short stalks to the trunk and thicker branches of the tree. Each pod contains 20 to 40 seeds arranged in rows and covered by white pulp. To become the cocoa beans of commerce, the seeds are extracted from the pod, piled in heaps and allowed to ferment from 5 to 7 days under a covering of leaves, and dried for 10 days.

Cocoa dominates Gold Coast production. In 1936–37 it accounted for 98 percent of the value of all agricultural exports and 63 percent of total exports. Important gold, diamond, manganese and bauxite industries contribute extensively to the colony's exports and revenue, but they are European enterprises the profits of which go largely to foreign shareholders. It is thus primarily, cocoa that has made the Gold Coast Africa's richest colony.

Britain's cocoa marketing control scheme was inaugurated when the war cut off markets, leaving the Gold Coast and Nigeria with large surpluses. The United Kingdom government undertook the risk of buying the whole crop, agreeing to take any loss on resale or, if a profit were made, to return the entire profit to the two colonies. This system of control was maintained in modified form after the war.

The primary aim of postwar marketing controls is to stabilize the price paid the native farmer, thus preventing disastrous fluctuations in his income. Price changes over the past 20 years have had drastic effects. In 1926–27 Gold Coast cocoa income was £11,334,000. By 1933–34 it had dropped to £2,675,000. In 1936–37 it was back up to £10,980,000, but had fallen again to £2,179,000 by 1942–43.

To fight these fluctuations the Gold Coast and Nigerian marketing boards place the present profits from cocoa sales in a reserve fund, which has now reached more than £20,000,000. This reserve is to be used primarily to keep up the price paid the farmer after the world market price falls. Research on cocoa development and the elimination of disease is to be financed from the reserve fund. Consideration is also being given to the idea of credit extension to cocoa farmers.

Future Prospects

Despite protests from American and British cocoa buyers, the marketing control scheme is destined to remain in operation. Moreover, the big demand and short supply of cocoa beans, according to the International Emergency Food Council, "will continue for some time." The Council has estimated that the 1947–48 demand will be around 800,000 long tons, and the supply under 600,000. Cocoa beans therefore will remain high in price.

Meanwhile, swollen shoot is spreading in the Gold Coast. In an area of 250,000 acres around Kofo-ridua and Tafo, it is estimated that more than half the mature cocoa trees are now dead, a capital loss of not less than £2,000,000, if each tree is valued at only one shilling. The West African Cocoa Research Institute, at New Tafo, has discovered that the swollen shoot virus can only be destroyed by cutting down infected trees. It is proving extremely difficult to persuade native farmers to destroy their own trees, although the Gold Coast Department of Agriculture has cut down 2,500,000.

Cocoa buyers in the United States, meanwhile, have set up a research committee to report on crop prospects and on the possibility of increasing Latin American production. The Liberia Co., organized by Stettinius Associates, hopes to develop an annual Liberian cocoa crop of 50,000 tons within ten years. These potential threats to British West Africa's paramountcy is not serious at the moment, however, for the world demand is likely to outrun the supply for many years to come.

GOLD COAST. Cocoa Sales and Prices 1926 to 1946.

Years	Firms, Purchases (tons)	Price to Farmer (£ per ton)	Value to Community (thousands)	Price Ex-quay New York* (£ per ton)
1926–27	237,000	45.70	11,334	73.04
1927–28	207,000	46.80	10,019	67.57
1928–29	241,800	34.02	8,565	55.17
1929–30	232,100	30.79	7,425	41.58
1930–31	223,400	16.58	3,972	25.37
1931–32	211,700	16.03	3,648	21.33
1932–33	255,700	15.35	4,232	21.17
1933–34	220,000	10.96	2,675	24.34
1934–35	276,000	13.24	3,958	23.04
1935–36	285,000	15.41	4,705	27.09
1936–37	300,000	35.60	10,980	45.03
1937–38	239,000	11.48	2,895	24.31
1938–39	208,000	11.98	3,868	21.75
1939–40	241,700	12.80	3,360	24.30
1940–41	237,000	9.92	2,635	29.80
1941–42	250,700	11.59	3,206	49.40†
1942–43	207,300	9.31	2,179	49.40†
1943–44	196,100	11.29	2,469	49.40†
1944–45	229,000	19.82	4,836	49.40†
1945–46	209,241	24.82	5,629	49.40†

*The world price.
†Ceiling price as fixed by OPA and removed in 1946.
Based on information supplied by the Agriculture Department of the Gold Coast Government and the West African Produce Control Board and reproduced in *The Economist* Nov. 8, 1947.

Farm Supplies for ERP

Anticipated shipments of farm equipment and fertilizer, under recovery program, differ little in percentage from exports during past three years

IF the aims of the European Recovery Program—briefly outlined in these pages last month—are accepted as sound, and the cost to the U. S. looked upon as a wise investment, the next consideration must be this country's ability to provide the needed materials without seriously hampering our own economy. We are told that the production bottlenecks will be in farm equipment, fertilizer and possibly seeds. But a study of these situations reveals that the anticipated difficulties are more apparent than real.

Farm equipment may be taken as an example. Actually the amount recommended for ERP is a lower percentage of our total production than was exported in most prewar years. No shipments were made in 1941, 1942 or 1943, but in 1944 exports were over 10 percent and by 1947 had risen to about 14 percent. It must be remembered that the estimates here are based on costs at factory and do not reflect shipping costs as is the case with the recommendations under the program.

Heavy Increases

In the meantime, equipment on U. S. farms has shown an enormous increase since 1940, according to Frederick B. Northrup, USDA branch director. There were about 1,500,000 tractors on farms in 1940. Today, he estimates a total of 3,000,000. In 1947, grain combines were approximately 240 percent of the 1940 total. Mechanical corn pickers in 1947 were more than double the 1940 figure. And there were twice as many milking machines in 1946 as in 1941. Nor did these increases in equipment take place as fast as farm workers dwindled during the war years. Today, therefore, there is considerably more equipment and an increasing farm worker population to produce about the same amount of food as was produced during the war.

While production of farm equipment remains the highest in our history, there are signs that domestic demand is easing. The drop in farm prices and the possibility of further price declines has put a damper on the demand for machinery at any price. The so-called gray market in farm equipment is about dead.

PAUL G. HOFFMAN, as head of the Economic Cooperation Administration, lost no time putting the European Recovery Program into action. The former Studebaker president has full powers under the terms as formulated by U. S. and participating nations.

And this optimistic view is not confined to the Department of Agriculture. The farm equipment industry committee recommended inclusion of about $91,000,000 worth of machinery for ERP. This recommendation, based on factory prices, is roughly equivalent to the $136,000,000, laid down in Europe, which appears in the final program. This $136,000,000, in turn, represents 85 percent of Western Europe's basic farm machinery needs for 1948.

Fertilizer Situation

Fertilizer supplies for the program countries offer an entirely different problem. Only small supplies are expected from the U. S., but these may be important.

To begin with, we will ship about 250,000 tons of phosphate (P_2O_5 basis), which is about 4 percent of our total production and about one-third as much as we were exporting before the war. The requirements of the ERP countries are estimated at 1,400,000 metric tons, in 1948. It is believed, however, that North Africa can supply most of the necessary phosphate rock.

No potash exports from the U. S. are proposed. The program areas were using about 1,300,000 metric tons of K_2O before the war and will need about 1,900,000 this year. France and western Germany hope to bring their production up to 1,300,000 tons this year and to raise it still further by 1950. Eastern Germany, Spain and Palestine will have to supply the balance.

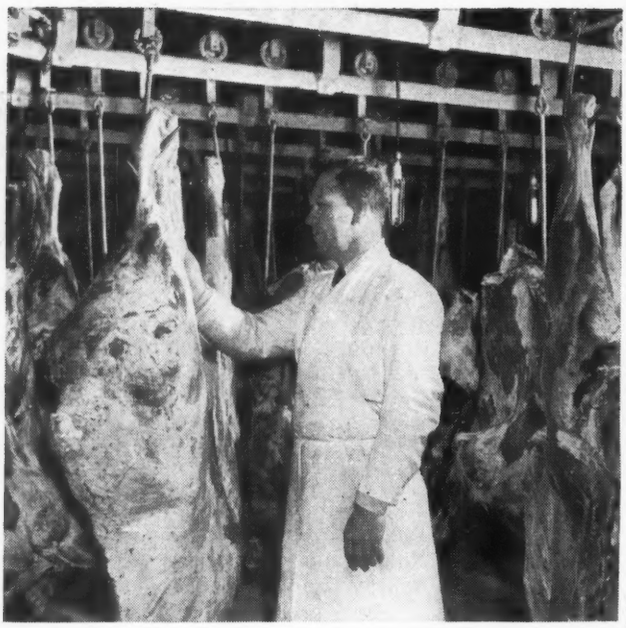
The world supply of nitrogenous fertilizer is about 3,000,000 tons, while the estimated requirements are approximately 4,000,000 tons. The program countries need to import about 423,000 metric tons. It is estimated, however, that the available supply for this year will be about half that much. The U. S. will supply about 24,000 tons of commercial nitrogen plus 47,000 tons from Army ordinance production for Bizone Germany. As the European countries increase nitrogen production in the later years of the program, imports will, of course, decline.

Thus, continued exports of fertilizer to program countries, during the next two years, will require a small amount of our domestic production. But this small amount is highly important in helping these countries to increase their own production in the last two years of the plan and thereafter.

Seed Supply

The seed situation is apt to change rapidly and depends on several factors. The ERP nations had been exporters of vegetable seeds in prewar years, supplying the U. S. along with the rest of the world. Both vegetable and field seed production in the U. S. was higher in 1947 than in 1946, but was below the 1941-45 average.

Despite a curtailed supply, however, there has been no overall seed shortage in this country, even though we have been exporting a sizable quantity, particularly to Germany. These exports will be much lower during the present year, though the picture is not clear as yet. It is expected that by fall, the experts on both sides of the Atlantic will be able to determine the specific seeds that are to be needed and by what countries.



AGING beef for 1 to 3 weeks in one of the aging rooms. Room is equipped with ultra-violet lamps and kept at 38 deg. F.

CUTTING meat into steaks, chops and roasts before wrapping and freezing.

Locker Plants Reach Out

Offer many services, including processing which competes with the meat packers. Provide bulk storage that can be used by frozen food packers and dairy industry

By BOYD H. KLINE, Columbia and Susquehanna Locker Plants, Bloomsburg, Pa.

FREEZER-LOCKER plants are now expanding their services and are operating on a commercial scale. This is especially true at the Columbia Locker Plants in Berwick and Bloomsburg, Pa., and the Susquehanna Locker Plants in Sunbury and Milton, Pa., where services are being offered on a national and local scale.

Bulk storage facilities for 3,000,000 lb. of frozen foods are available at the Sunbury plant for western packers and wholesale distributors on the eastern seaboard. Here frozen foods, shipped from the west, can be held at storage-in-transit rates. When needed they can be reshipped in small lots to local distributors or in carload lots to wholesalers in the New England States, New York, Philadelphia, Baltimore and Washington. In this way, demurrage costs are lowered. Furthermore, storage in refrigerator cars is no longer necessary, particularly when space is not available in warehouses east of Sunbury. At the same time, some relief is given to the present reefer car shortage.

Local services are provided to farmers, institutions and townspeople in the form of processing, locker space rental, wholesale buying and retailing fresh, frozen and canned foods in the locker plant retail stores. Large local poultry growers, wholesale distributors, dairies, ice cream plants and other food processing plants may use the bulk freezer storage facilities.

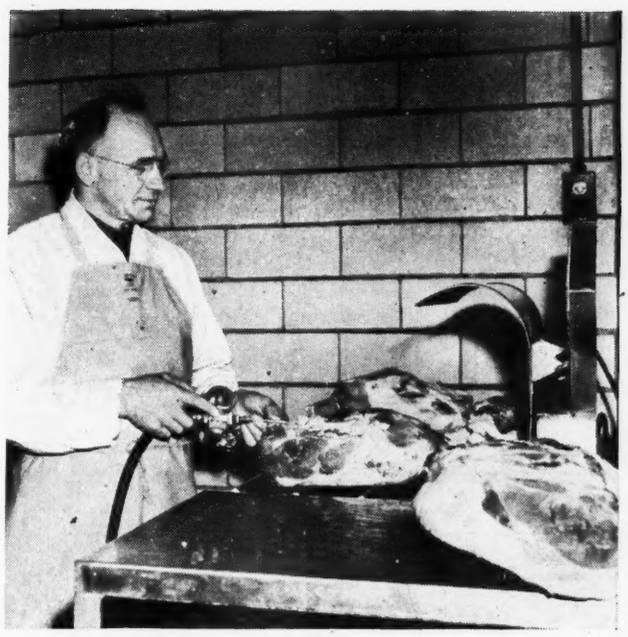
The Bloomsburg plant is now being converted into a well-equipped meat packing plant. Unlike the other three plants where processing is complete except for slaughtering, hog and cattle holding bins are being built and slaughtering services will soon be available for farmers and townspeople who buy from farmers.

In addition, these locker plants carry a complete line of packaging material as well as preservatives like ascorbic acid and sugar sirups for frozen foods. For those who do not wish to rent lockers, the stores sell frozen food cabinets.

The locker plants also operate a 300-acre farm with 200 head of Hereford steer, 300 hogs and 2,500 capons. Some of the animals are sold locally at wholesale. Others are slaughtered, processed and sold wholesale or retail at the locker plants.

Complete processing services are furnished to local farmers, clubs, hotels, restaurants and small locker renters at the rate of $0.03 per lb. Processing will soon include slaughtering. At present it consists of (1) Chilling and aging of beef, (2) cut-

There is a trend in the freezer-locker plant industry which means more competition for food processors. Many operators are expanding their services and are operating on a broad commercial scale. At the same time, the expanded plants are providing new storage and distribution service to frozen food packers, dairies, and ice cream manufacturers. Also, a substantial saving in distribution costs is claimed, which reacts to the immediate benefit of the consumer patron. These significant developments are exemplified by the Pennsylvania locker plants described in this article. — The Editors.



PUMPING curing brine into hams with an artery pressure pump. Scale shows when proper amount of brine is used.

HAMS are removed from smoke room where they have been smoked for 36 to 48 hours.

STACKING frozen meat in bulk freezer storage room. Rooms at the Sunbury plant have a capacity of 3,000,000 lb.

LOCKER rooms have lockers and bins. Lockers are rented to farmers and townspeople and bins to institutions.

ting and wrapping of all meats, (3) poultry dressing and wrapping, (4) freezing, (5) locker storage, (6) curing and smoking of pork, (7) preparing sausage meat and scrapple and (8) rendering lard. Soon arrangements will be made also for manufacturing precooked frozen foods.

Each locker plant has large chilling and aging rooms, where quarters and smaller cuts of beef are chilled and aged. Beef is chilled for 24 hours in the chilling room, which is kept at 36 deg. F. After the animal heat is removed from the beef, the meat is aged for 1 to 3 weeks at 38 deg. F.

Cutting and wrapping follow the aging process. And, at this point, butchers cut beef, veal, lamb and pork. Steaks, chops and roasts are prepared as well as hamburger, sausage and scrapple.

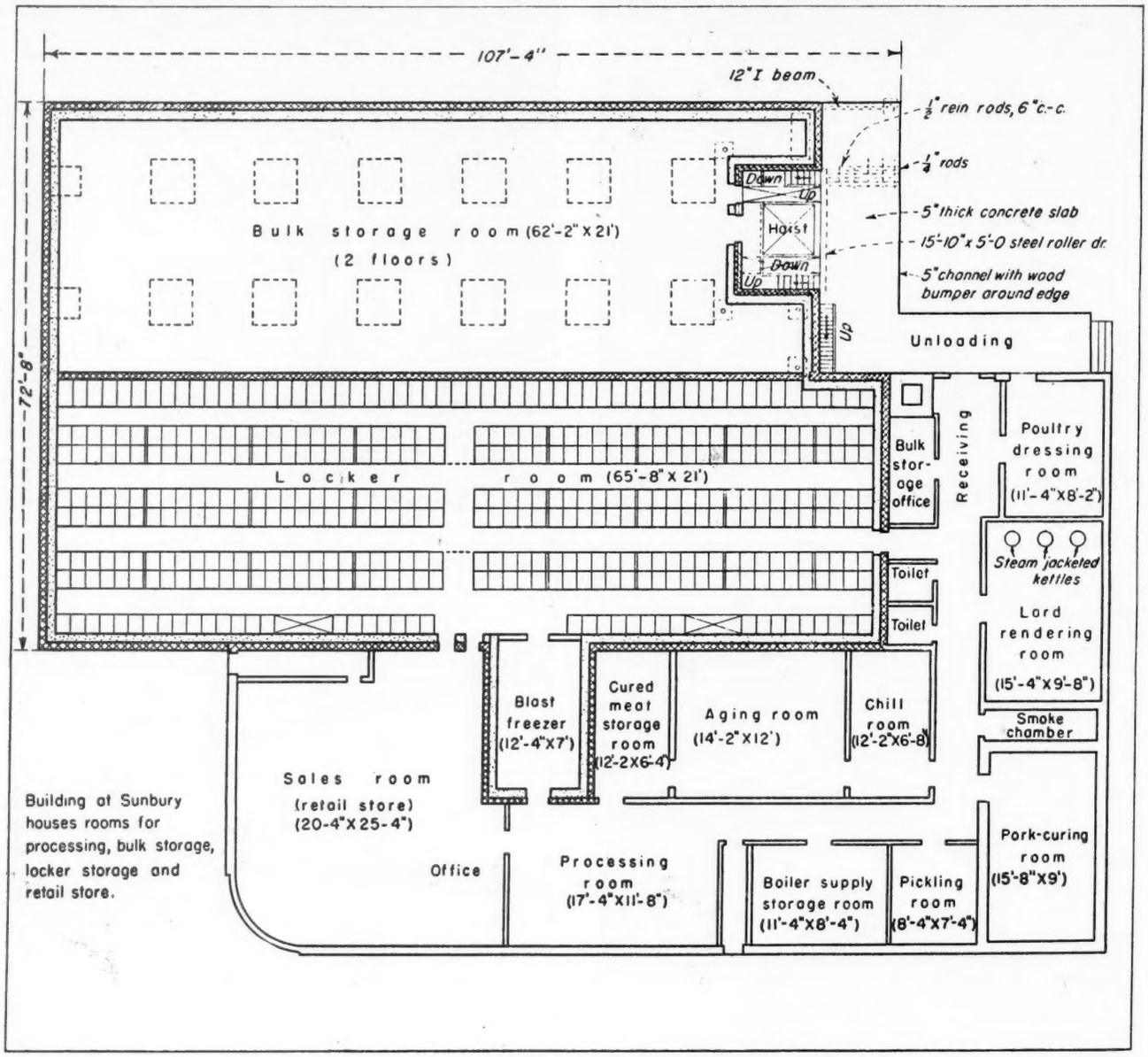
Freezing is done at all four plants in an air blast freezer maintained at −20 deg. F. After quick freezing, the meats are put in lockers kept at −3 deg. F. Here beef, lamb and poultry can be held 12 months or longer and pork for six months.

Poultry Dressing

Each of the four locker plants handles about 400 chickens or 200 turkeys a day (8 hr.), using the latest poultry dressing equipment. To avoid contact with beef, veal, lamb and hog carcasses, live poultry is delivered into the poultry dressing room through a separate door. One worker kills the poultry in slaughtering cones and immerses them for one minute in scalding vats kept at 140 deg. F. Another operator defeathers the birds with a poultry picking machine. A third operator scrubs and singes the birds. Still another operator eviscerates, sprays and washes the poultry in chilling vats.

From this point the poultry is taken to the processing room, where it is cut according to the customer's instructions, wrapped, frozen and placed in lockers. Eviscerated poultry may be wrapped whole or cut in

Bulk Storage Is a New Service Provided by Freezer Locker Plants



LOCKER plant services at the Sunbury plant cover bulk storage at storage-in-transit rates, meat processing, packaging, freezing, locker storage and wholesale buying. Plant also operates a retail store.

parts, quarters or halves, and wrapped.

Pork Curing and Smoking

By using the pork curing facilities at the locker plants, farmers can now butcher hogs three or four times a year, instead of once. This service, therefore, assures them of better quality pork at all times.

Hams are pickled in the pork pickle room. To pump the proper amount of curing brine into each ham, 40 lb. artery pressure pumps and automatic scales are used. Here, too, hams and bacons are branded with a customer's number.

In the pork cure room, hams are cover-cured and bacons are dry-cured in bacon boxes for 18 days at 40 deg. F. After curing, the hams and bacons are smoked for 36 to 48 hours in the smoke room.

Pork trimmings are made into sausage meat or scrapple and pork fat is rendered into lard. Pork curing services are charged to customers at the rate of $0.06 per lb. Scrapple making costs $0.10 a lb.

The locker renters prepare and package fruits and vegetables themselves. Freezing and storage is done by the locker plants.

Locker Storage

The locker rooms are equipped with lockers and bins of various sizes. At the Sunbury plant, for example, there are 2,345 lockers and bins. The 3½ cu. ft. lockers hold 110 lb. of food, and rent for $9.00 a yr. These are used also as overflow lockers and, in that case, rent on a monthly basis. Lockers, 7 cu. ft. in capacity, hold 225 lb. of food and rent for $16.00 to $18.00 a yr.

Locker bins are rented to large users such as hotels, clubs and restaurants. The 36 cu. ft. bins hold 1,050 lb. and rent for $45 to $55 a yr. The larger 70 cu. ft. bins hold 2,200 lb. and rent for $95 to $110 a yr.

Refrigerating Equipment

Thermostatically controlled Carrier Corp. equipment is used at all plants. At the Sunbury plant, 40-hp. freon compressor operates two blower units in the second floor bulk freezer storage room. In case of failure of this compressor, refrigeration is automatically supplied to the units by two 10 hp. compressors operating the blast freezer. The bulk storage rooms are maintained

Slaughtering Facilities Will Make Processing Operations Complete

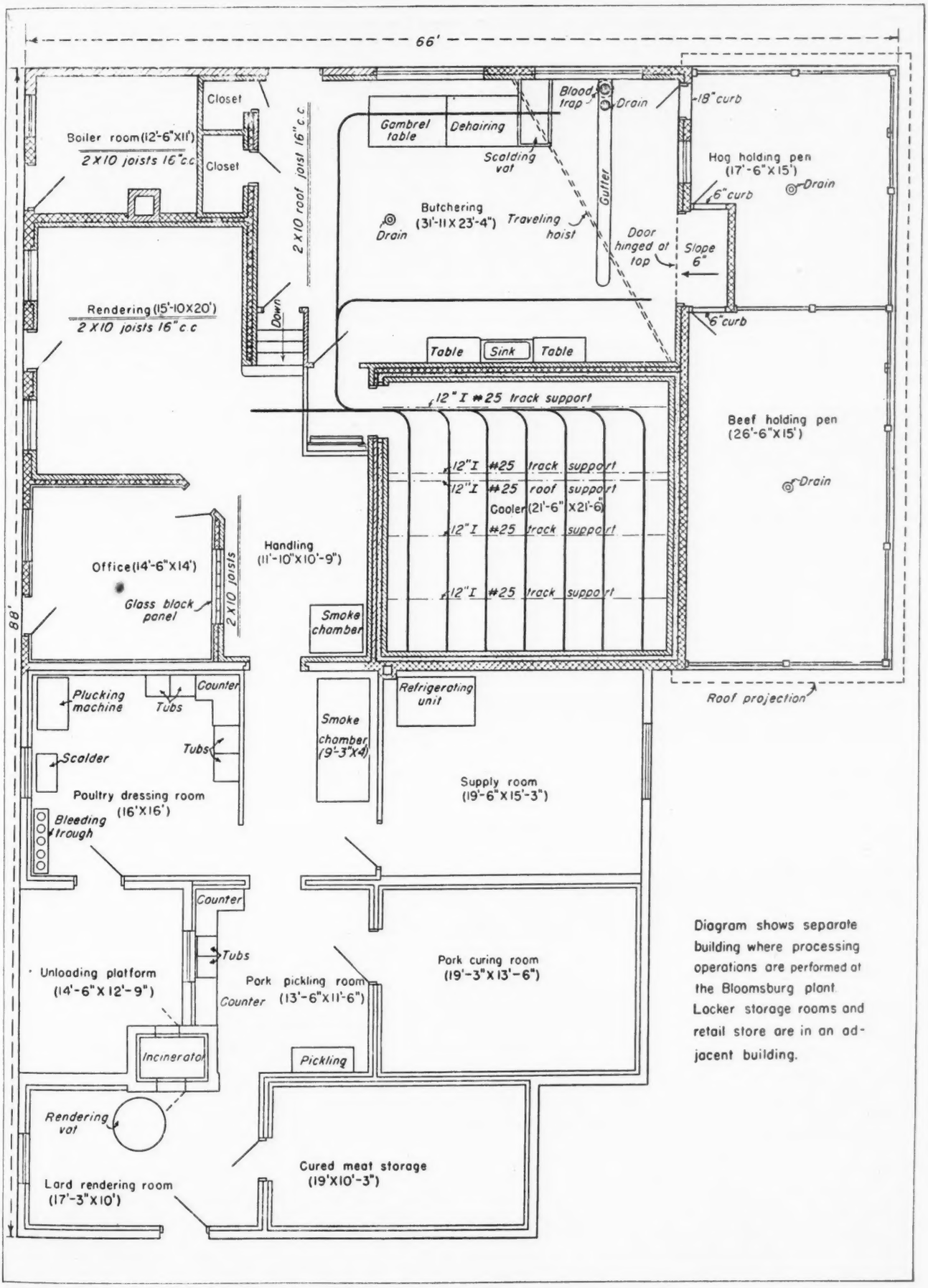
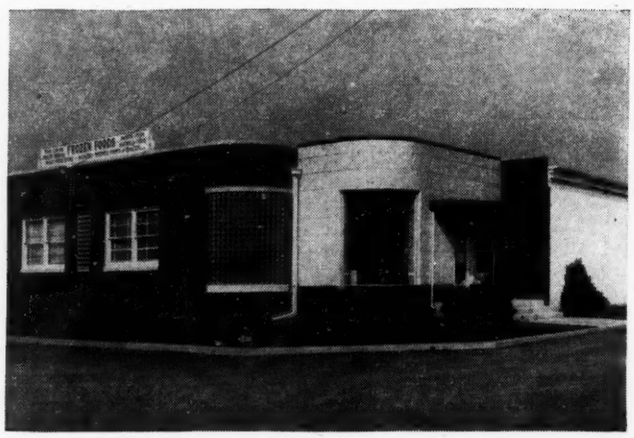


Diagram shows separate building where processing operations are performed at the Bloomsburg plant. Locker storage rooms and retail store are in an adjacent building.

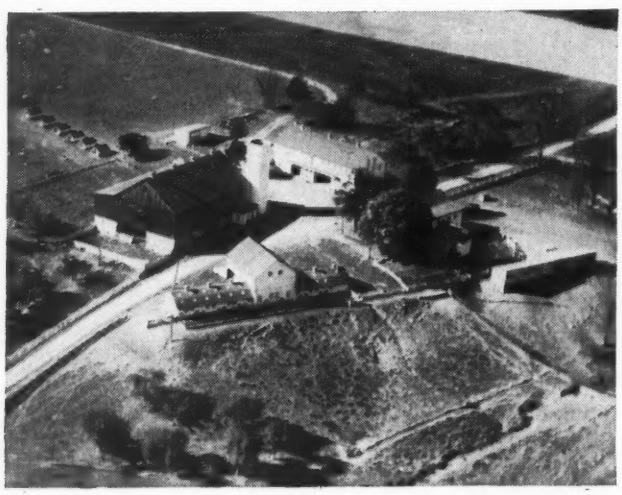
COMMERCIAL meat packing facilities will be available at the Bloomsburg plant after installation of animal holding pens and a slaughtering room. Live animals will be taken from farms, slaughtered, processed and packaged meats stored.

Locker Plant Method Eliminates Many Handlings and Reduces Costs

PLANT at Bloomsburg will soon go entirely commercial when construction of animal holding pens and a slaughtering room are completed.

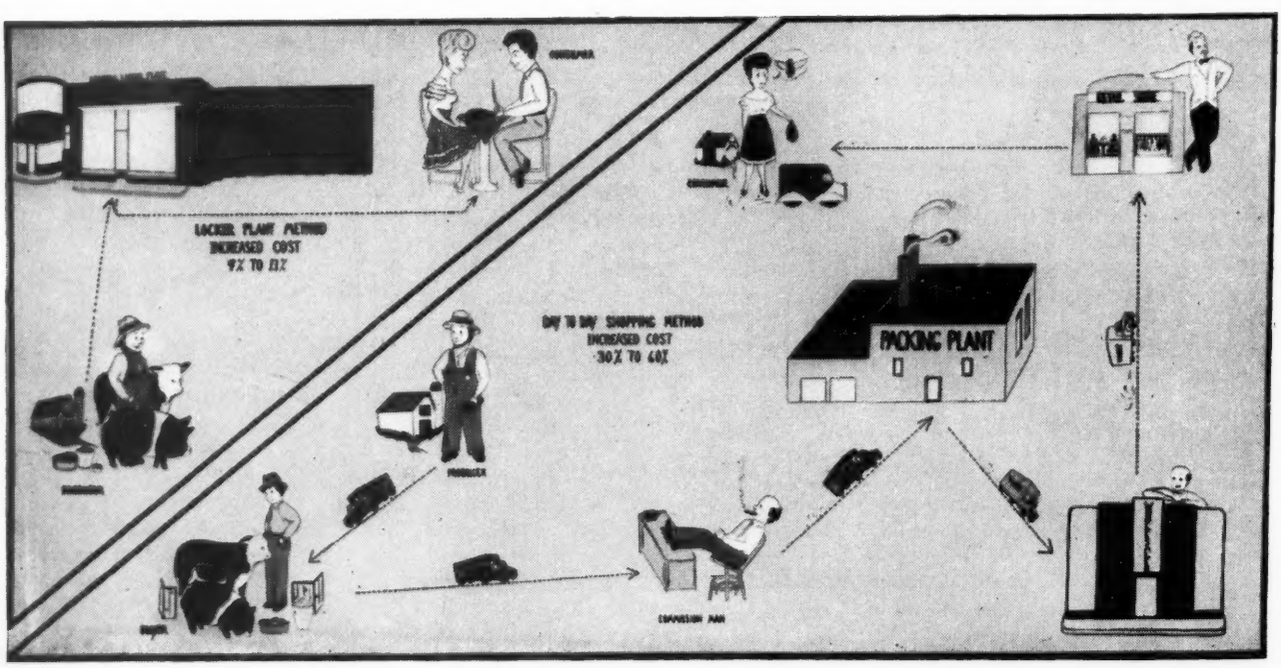


NEW PLANT at Berwick, Pa. is completely modern. Plant offers its facilities to farmers, townspeople and many local institutions.



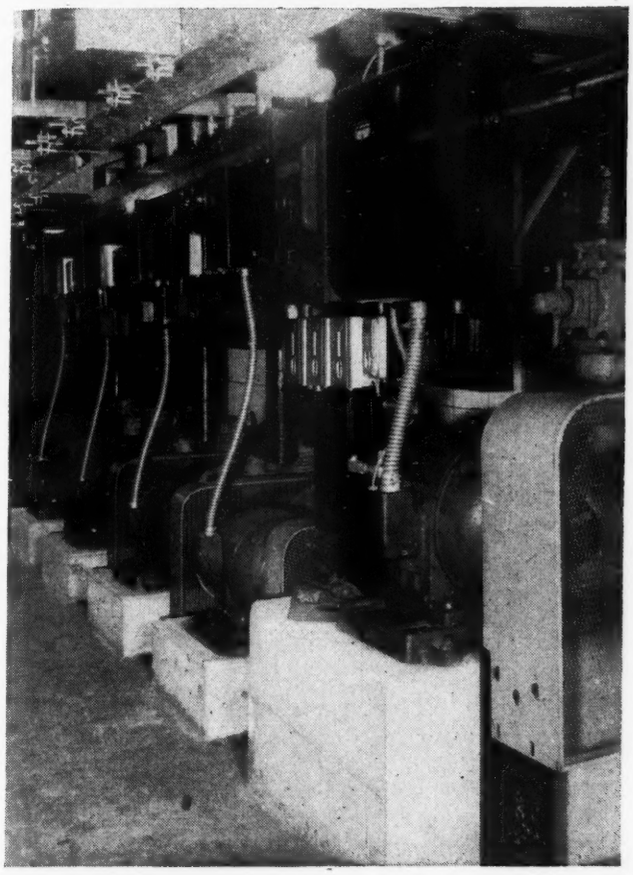
FARM operated by the locker plants. Animals from the farm are slaughtered, processed and sold wholesale or retail.

RETAIL STORE at one of the freezer locker plants. Stores carry fresh and frozen foods and sell home freezers.

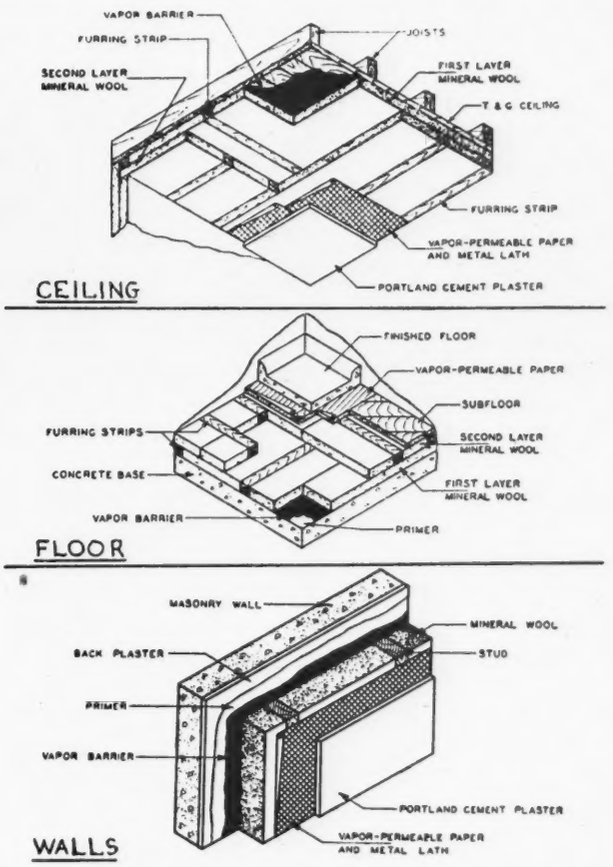


ADVERTISEMENT shows how freezer locker plant's customers save money by using its facilities. Cost of processing increases meat price 9 to 13 percent. Processing and handling through usual trade channels add 30 to 60 percent to cost.

Additional Thicknesses of Mineral Wool Lower Refrigerating Costs



COMPRESSORS operate locker, chill, aging and pork curing rooms at the Sunbury plant.



MINERAL wool installation technics at Sunbury plant. Floors, ceiling and walls have 16, 18 and 14 in. of wool.

at −5 deg. F.

Two 10 hp. freon compressors are used for the locker room and there are separate 3-hp. compressors for the chill, the aging and the pork curing rooms.

There is an interesting feature in the construction of the second floor bulk storage room. The floor is supported from the floor below on steel columns, instead of by the walls. This construction permits cold air delivered to the upper room to circulate downward to the lower storage room through 6-in. spaces between the walls and the floor.

Mineral wood is used extensively in three of the locker plants, to minimize the initial and operating cost of the refrigerating equipment, brick and cinder block walls were vapor-sealed with 3-ply asphalt before the mineral wool was applied. In addition, better insulation was provided by using several more inches of mineral wool than is generally specified.

Vapor-sealing prevents moisture from permeating, condensing and freezing within the insulation. This is true regardless of the insulating material used. The floors, ceilings and walls are built up from the joists with mineral wool, metal lath and plywood and asbestos board.

With such marked savings, coupled with the year round availability of "fresh" vegetables, fruits and meats, it is easy to understand the great popularity of locker plants in the food producing states of the middle west. And this popularity is steadily moving eastward.

From an economic standpoint, the frozen food locker plant in the rural farming sections of this country is here to stay. These economies hold true whether locker plant users buy frozen food in wholesale quantities at the locker plant or purchase fresh food direct from farmers and use locker plant services.

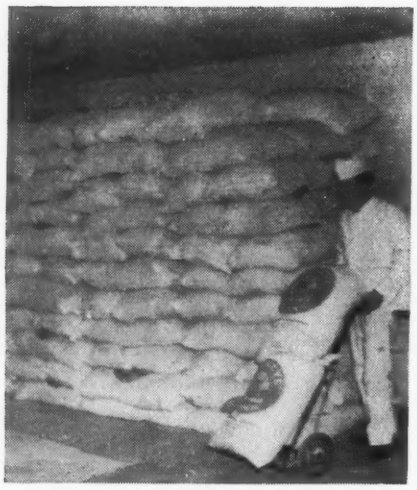
For those who do not care to process their fruits, vegetables, beef, pork and poultry themselves, these frozen foods can be purchased in wholesale quantities at the locker plant and then placed in the lockers at a saving. A family of four, for example, can save approximately $130 a year by buying wholesale and using a $14 and $16 locker. By purchasing the same quantity of food from local farmers and using the locker plant services, this family can save $220 a year.

Figures compiled from tests made by locker plant users have shown the following savings on foods frozen and stored in locker plants over frozen food bought at retail prices: (1) Sweet corn, 52 percent; (2) Fordhook lima beans, 55 percent; (3) peas, 60 percent; (4) peaches, 64 percent; (5) strawberries, 33 percent; (6) beef, 21 percent; (7) pork, 19 percent and (8) poultry, 30 percent.

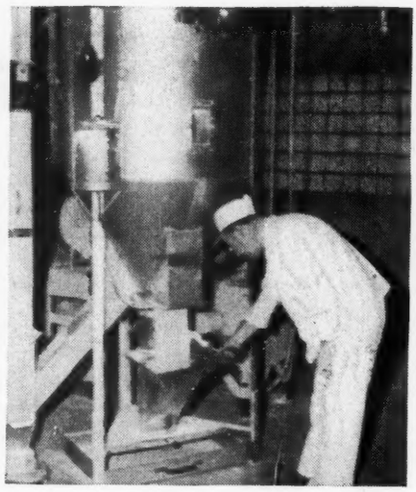
Many locker patrons raise their products themselves. Therefore, their savings would be even greater.

A breakdown on the 21 percent locker plant saving made on beef is:

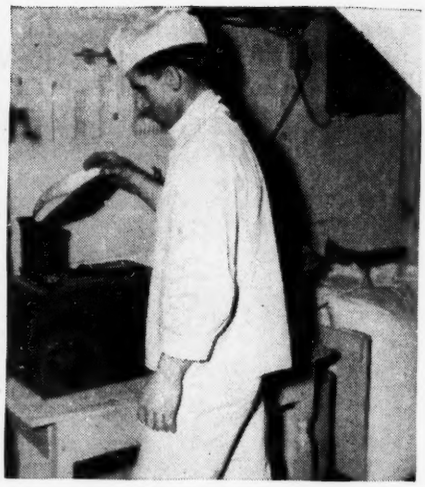
Day-to-day shopping method	
Retail 1-600 lb. steer, dressed at $0.48	$288.00
33⅓ percent mark-up from producer, via commission man, packer, wholesaler and retailer	96.00
	$384.00
Locker plant method	
Retail 1-600 lb. steer, dressed at $0.48	$288.00
Processing and freezing 600 lb. at $0.03	18.00
	$306.00
Locker Saving	$78.00



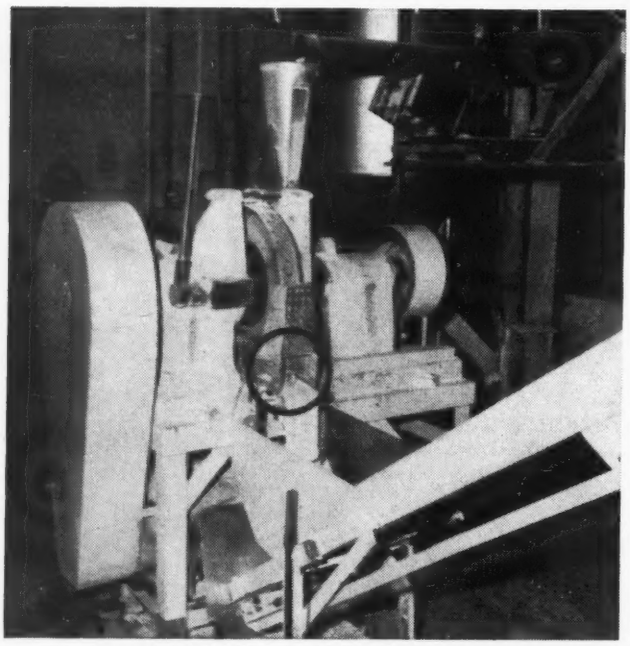
1. YELLOW corn meal of specified grade and grind is used.



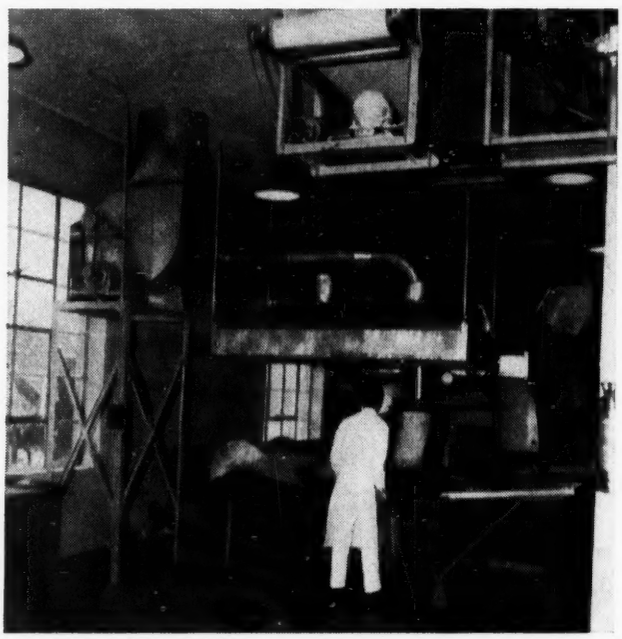
2. MOISTURE content of meal is adjusted by blending.



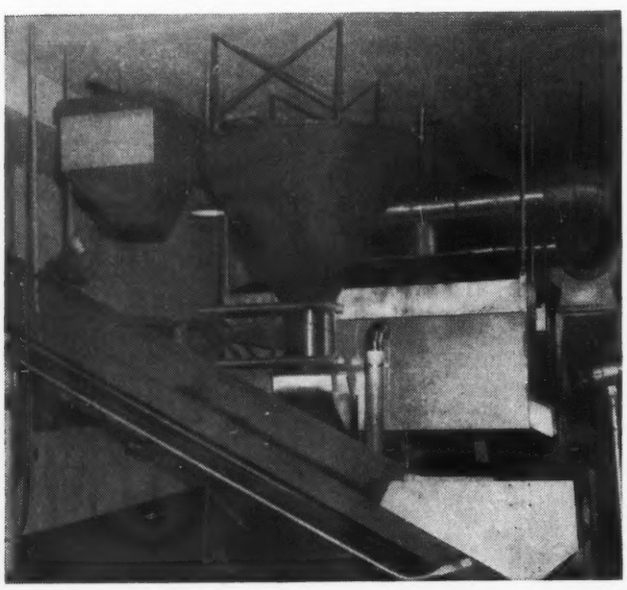
3. CONDUCTIVITY readings show water needed.



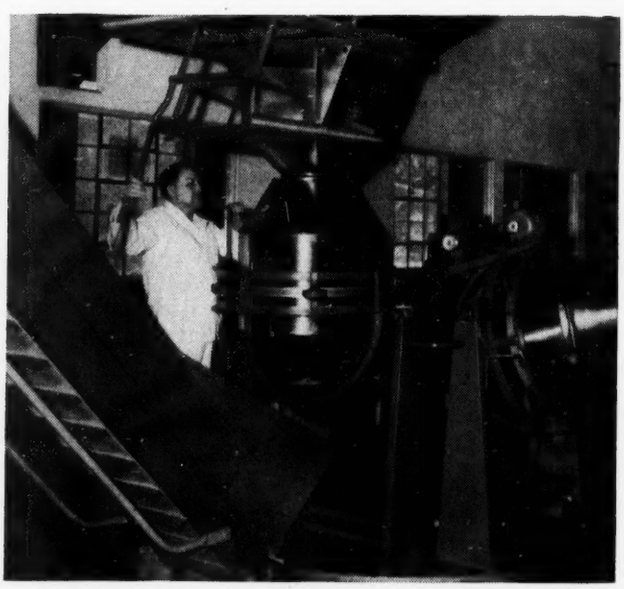
4. EXTRUSION of standardized meal through small orifice at high pressure produces elongated curls.



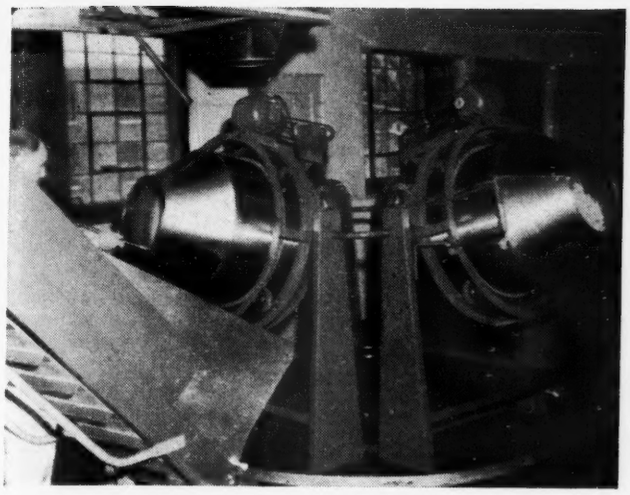
5. COOKING. At 2-min. intervals 12-lb. batches of collettes are mechanically dropped into hot fat.



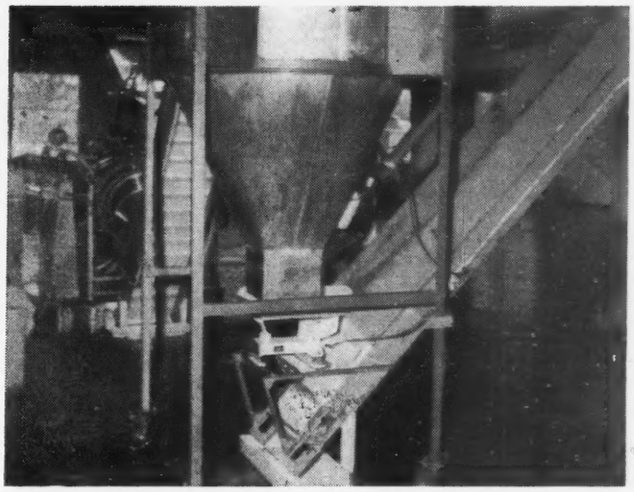
6. COOLING. After draining, collettes are dropped onto a fan-cooled, Neoprene belt conveyor.



7. PARTIALLY cooled collettes are measured into tilting, revolving drums mounted on rotating base.



8. FLAVORING. Charged drums are tilted and sprayed with cheese emulsion, tumbled and salted.



9. KURLS are discharged from tilted drum in background onto belt elevator for delivery to packaging.

Korn Kurls In Volume

Adams Corporation, Beloit, Wis. opens Korn Kurl plant to process and package cheese-flavor-coated, deep-fat-cooked, puffed yellow corn shreds

By E. S. STATELER, Associate Editor "Food Industries," Chicago

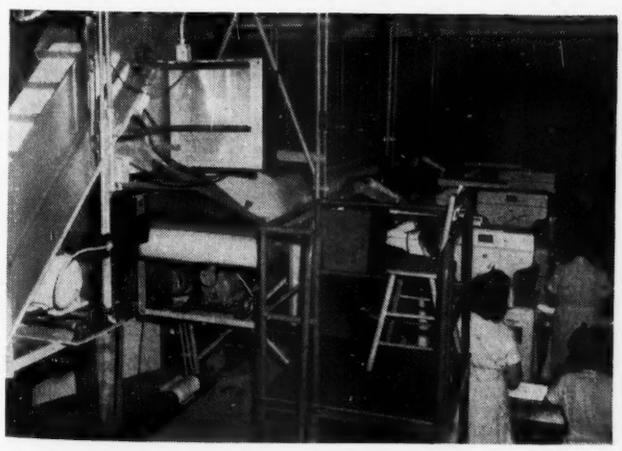
FROM a blueprint plan to a fully modern, sanitary and operating establishment in 15 months is the achievement of the Adams Corporation as represented by its Korn Kurl Division plant under the general managership of H. W. Adams.

Designed for straightline production and equipped for continuous and largely mechanical operation, the plant is of glass brick, steel and masonry construction. In area, it consists of one street-level floor and a basement, of 10,000 sq. ft. each, sufficient to house the offices of the company, to store adequate reserve supply of materials, supplies and finished product to maintain production and meet shipment commitments and to house at least six processing and packaging lines of 7,000 lb. capacity of finished Kurls each per 8-hr. working day.

All processing and packaging equipment is of stainless steel construction, is designed for ease of cleaning and is connected with sanitary neoprene-coated belt conveyors to permit uniform and continuous operation from the making of the yellow corn meal "collettes" to the packaging of the finished "Kurls". At no station in the production line from the charging of the meal into the vertical blender to the heat-sealing of the transparent bags is manual handling of the product necessary. Even the weighing and filling of the bags are automatic, although feeding of the bags to the filler and the heat-sealer is still done by hand.

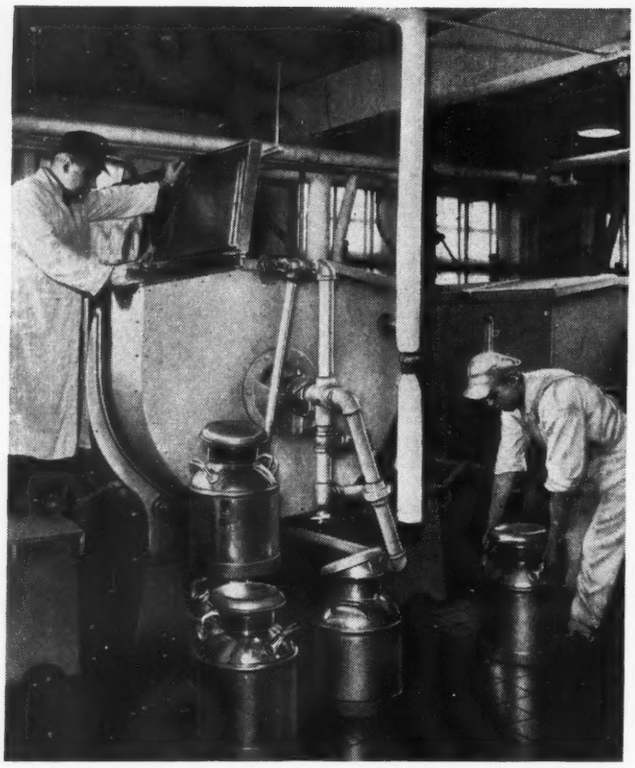
When opened in December, the plant was equipped to package 75,000 bags, 1 3/8 oz. each, per 8-hr. day on a single packaging line, with partial installation for a second line to be completed by spring.

Adams Corporation has only the one processing plant but Flakall Corp., the parent company, licenses other processors of the collettes in New Orleans, Reading, Pa., and other cities. Prior to the opening of the new plant, Adams Corporation operated a small experiment plant to work out details of equipment design, product composition and packaging.

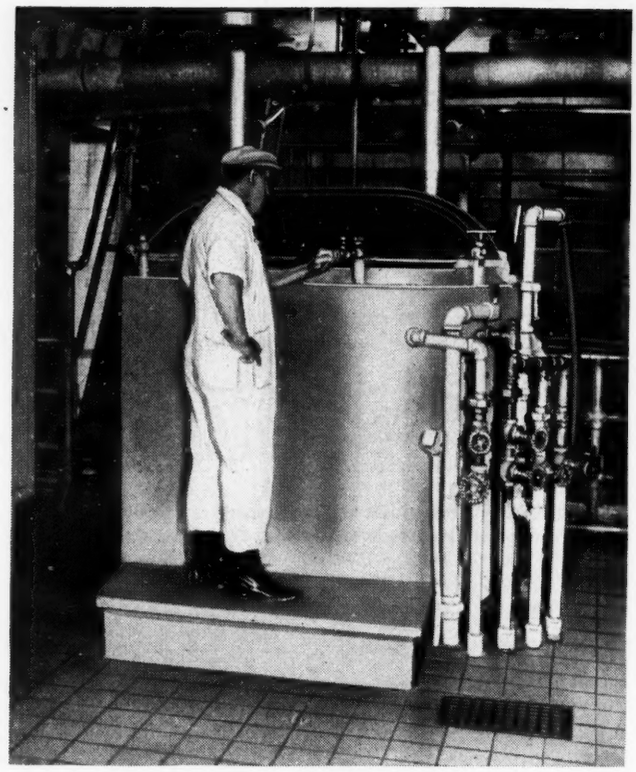


10. KURLS are elevated from storage hopper to distributor belt supplying bagging machines.

11. PACKAGING. Girls, background, place bags at filling station. Sealed bags are packed (front).



PASTEURIZED and selectively cultured skim milk is commonly used as the flavor-imparting constituent.



EMULSIFICATION of vitamin-enriched, salted oils or fats and milk is the result of the churning process.

Margarines Are Unaffected By Low Temperature Storage

Margarines stored for 538 days at 5 and -10 deg. F. kept original quality. Those stored at 28 and 45 deg. F. were not marketable

By A. A. KIESS, R. W. BATES and C. K. WIESMAN
Chemical Research and Development Department,
Armour & Co., Chicago

MARGARINES containing animal fats or made of soya oil exclusively can be stored at 5 and −10 deg. F. for approximately 1½ yr. without appreciable change in color, texture or flavor, according to results obtained in a series of storage tests recently completed by Armour and Company research laboratories.

These studies were made on four different types of margarines (Table I), stored for a total of 538 days at four different temperatures and tested at intervals of 34, 82, 156, 240 and 538 days for deterioration in physical properties and palatability. Those stored at 28 and 45 deg. F. showed the greatest and most significant changes even to becoming unmarketable in some instances.

The results of these studies are significant and of economic importance to margarine manufacturers and users. Both are periodically affected by changing market conditions and, at times, find long storage under refrigeration advisable. This situation was particularly the case during the war when fats were scarce and shipments and production uncertain. It was then advisable to make margarine when fats and oils were available and to store it for future disposition. Further, with the growing increase in frozen food stores and locker plants there is a definite trend towards storing margarine and selling it in the frozen state. These are some of the factors that encouraged the study of the effect of low temperature storage on the quality of margarine.

Margarine, as it is now marketed,

CONTINUOUS chilling of the margarine permits direct, automatic, and sanitary packaging.

FLAVOR and odor of finished product are taste-tested in consumer test kitchen of Armour & Co.'s Chicago plant.

is made from vegetable oils, animal fats or a combination of both. The vegetable oils used are usually cottonseed, soya or peanut in the refined natural or hydrogenated (hardened) form. The animal fats may be refined oleo oil, oleo stock, oleo stearine or neutral lard. Hydrogenated and deodorized rendered pork fat is also sometimes used.

These fats and oils are churned with skimmed milk, previously inoculated with a lactic acid starter, to form an emulsion. The oils and fats in this emulsion are crystallized with entrapment of some of the milk solids while being passed between and over chilled rolls, through a continuous chilling unit or by contact with a spray of cold water. The last named operation is known as "water crystallizing". Regardless of the method used, carefully controlled chilling conditions are essential to imparting the desired plastic properties to the fat and oil crystals.

From this summary of margarine compositions and methods of manufacture, one becomes aware that margarines may vary considerably and that any study of factors which may affect its quality should include several types of margarines.

Margarine is generally considered to be a perishable food and as such has always been kept under refrigeration during distribution and marketing. Refrigeration has been at the customary 40 to 50 deg. F. temperatures and storage periods have been for limited time, without any apparent deterioration in quality.

When the conditions for these studies were being decided upon, the conviction was that low temperature storage should not affect the margarines adversely. Various opinions expressed by competent authorities, however, cast some doubt on its advisability. Some thought that margarines containing oleo oil would develop a tallowy flavor and a greenish color during long storage at low temperatures. Also, it was thought that margarine would become extremely brittle and would not regain its original plasticity or texture after being stored at low temperatures. Little, if

TAELE I—PHYSICAL CONSTANTS OF THE FOUR FORMULAS FOR MARGARINES STUDIED.

Formula no.	Ingredients	Analysis of original margarine fat				Remarks
	Fats of margarines studied	"C" no.	Melting point—Wiley	Congealing	Penetration	
A	Neutral lard Extra oleo oil *Hydro pork fat *Hydro soybean oil	27.0	39.4	26.7	92	Made on commercial chilling Unit
B	*Hydro pork fat Extra oleo oil *Hydro soybean oil	25.7	38.2	27.0	85	"
C	*Hydro soybean oil	20.8	36.8	27.8	155	"
D	Extra oleo oil *Hydro soybean oil	21.8	32.8	25.0	98	Water crystallized

* Hydrogenated.

TABLE II—PENETRATION DATA ON MARGARINES STORED FOR 34 DAYS AT FOUR DIFFERENT TEMPERATURES.

Formula no.	Held before storing at	Sample no.	Penetration Readings — Storage temperatures			
			−10 deg. F.	5 deg. F.	28 deg. F.	45 deg. F.
A	70 deg. F. for 24 hr.	1	88	88	85	80
B	"	2	84	88	68	70
C	"	3	140	145	140	126
D	"	4	82	85	85	85
A	70 deg. F. for 48 hr.	5	80	80	80	82
B	"	6	75	75	78	75
C	"	7	148	135	140	145
D	"	8	85	85	80	85
A	45 deg. F. for 48 hr.	9	80	85	88	73
B	"	10	88	82	85	65
C	"	11	145	142	140	130
D	"	12	80	85	80	95

The color, odor and flavor were satisfactory in all cases except the flavor of those stored at 45 deg. F., which was considered only "fair."

Flavor, Color and Consistency of Margarine Were Tested

TABLE III—PENETRATION DATA ON MARGARINES STORED FOR 82 DAYS AT FOUR DIFFERENT TEMPERATURES.

Formula no.	Held before storing at	Sample no.	Penetration Readings — Storage temperatures			
			−10 deg. F.	5 deg. F.	28 deg. F.	45 deg. F.
A	70 deg. F. for 24 hr.	1	85	85	85	80
B	"	2	80	82	75	65
C	"	3	142	155	160	120
D	"	4	80	82	78	82
A	70 deg. F. for 48 hr.	5	84	86	82	85
B	"	6	77	78	90	66
C	"	7	148	148	155	140
D	"	8	88	88	80	83
A	45 deg. F. for 48 hr.	9	84	78	80	75
B	"	10	88	85	80	72
C	"	11	145	145	140	118
D	"	12	80	88	78	73
Flavor of the group			Good	Good	Good	Fair
Color of the group			Good	Good	Good	Good

TABLE IV—PENETRATION DATA ON MARGARINES STORED FOR 156 DAYS AT FOUR DIFFERENT TEMPERATURES.

Formula no.	Held before storing at	Sample no.	Penetration Readings — Storage temperatures			
			−10 deg. F.	5 deg. F.	28 deg. F.	45 deg. F.
A	70 deg. F. for 24 hr.	1	85	80	90	80
B	"	2	85	85	72	67
C	"	3	165	160	160	130
D	"	4	95	90	100	90
A	70 deg. F. for 48 hr.	5	88	85	82	75
B	"	6	80	80	75	75
C	"	7	150	160	160	145
D	"	8	90	90	95	90
A	45 deg. F. for 48 hr.	9	80	85	80	72
B	"	10	80	80	80	60
C	"	11	140	160	156	120
D	"	12	92	85	100	90
Flavor of the group			Good	Good	Fair	Poor
Color of the group			Good	Good	Good	Good

TABLE V—PENETRATION DATA ON MARGARINES STORED FOR 240 DAYS AT FOUR DIFFERENT TEMPERATURES.

Formula no.	Held before storing at	Sample no.	Penetration Readings — Storage temperatures			
			−10 deg. F.	5 deg. F.	28 deg. F.	45 deg. F.
A	70 deg. F. for 24 hr.	1	94	84	86	70
B	"	2	90	85	78	68
C	"	3	145	145	147	120
D	"	4	100	90	90	80
A	70 deg. F. for 48 hr.	5	84	82	88	72
B	"	6	76	79	78	78
C	"	7	146	144	145	130
D	"	8	100	88	83	80
A	45 deg. F. for 48 hr.	9	89	86	84	78
B	"	10	85	88	86	78
C	"	11	145	150	145	125
D	"	12	98	82	84	82
Flavor of the group			Good	Good	Fair	Poor
Color of the group			Good	Good	Good	Good

The samples held at 45 deg. F. were not considered marketable. Formula A margarine had developed a grainy texture. All others had smooth textures; including those with a "fair" to "poor" flavor

TABLE VI—PENETRATION DATA ON MARGARINES STORED FOR 538 DAYS AT FOUR DIFFERENT TEMPERATURES.

Formula no.	Held before storage at	Sample no.	Penetration Readings — Storage temperatures			
			−10 deg. F.	5 deg. F.	28 deg. F.	45 deg. F.
A	70 deg. F. for 24 hr.	1	102		92	
B	"	2	115		80	
C	"	3	166		178	
D	"	4	103		104	
A	70 deg. F. for 48 hr.	5	93		92	
B	"	6	75		74	
C	"	7	150		159	
D	"	8	95		84	
A	45 deg. F. for 48 hr.	9	98		83	
B	"	10	80		78	
C	"	11	146		159	
D	"	12	100		97	
Flavor of the group			Good		Poor	
Color of the group			Good		Good	

Penetration tests were not made on the margarines stored at 5 deg. F. and at 45 deg. F. The flavor of the samples stored at −10 deg. F. and 5 deg. F. were considered "very good". Those stored at 45 deg. F. were decomposed and those stored at 28 deg. F. were not considered marketable.

any, information was available on the effect of low temperature storage on margarines containing hydrogenated vegetable oil.

Although flavor, odor and texture are the most important characteristics in evaluating margarine quality, general appearance must also be considered. In these studies organoleptic methods were used where appropriate because this is about the only way flavor and odor can be evaluated. On the other hand, various physical means may be used to measure texture or plasticity. The penetration test was chosen for this study using the A. S. T. M. penetrometer and cone, long regarded a standard method for testing margarines and shortenings.

Test Procedure

The Wiley melting point and congealing points were determined by the methods given in "Standard Methods of American Oil Chemists' Society". The "C" number, a modified congealing point, is defined and the method of determination is described in *Oil and Soap*, XXII, February 1945.

The margarines studied were made according to formulas A, B, C, D, indicated in Table I and the test procedure was as follows:

Twelve cases (each containing 32 one-pound cartons) of each of the four types of margarines, were taken off the packaging line.

Four cases of each type were tempered at 45 deg. F. for 48 hr. One case of each lot was then placed in storage at −10, 5, 28, and 45 deg. F.

Four cases of each type were tempered at 70 deg. F. for 24 hr. and distributed in storage at the same four temperatures.

A third set was tempered at 70 deg. F. for 48 hr. and stored at the same four temperatures.

One-pound samples from each lot were removed from storage periodically and tempered at 70 deg. F. for 48 hr. before testing. Penetration values were determined and flavor, odor and appearance recorded. Ease of color incorporation into each margarine and its creaming ability were also observed.

Results of Tests

Examination of each of the samples by both penetration and organoleptic methods after each storage period disclosed the data given in Tables II, III, IV, V and VI, which are summarized as follows:

(a) After a storage period of 34 days (Table II), the color, odor and flavor were satisfactory in all cases except the flavor of those stored at 45 deg. F., which was rated at only "fair."

(b) Little change from the 34-day storage results was indicated at the end of the 82-day storage period (Table III).

(c) Examination of the group at the end of 156 days' storage (Table IV) disclosed that the flavor of samples stored at 45 deg. F. was "poor"

(*Continued on page* 219)

New Knowledge Through Research

Bureau of Agricultural and Industrial Chemistry reports on new discoveries. Findings are important to food processors.

HELP all along the food processing line is seen in the latest annual report of the Chief of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration. The report for the 1947 fiscal year covers 55 different titles. Some of the projects were started for the purpose of improving a process, others sought to minimize impairment of quality; still others looked to more efficient utilization of by-product materials.

Products investigated varied from corn to cucumbers. Reports on some projects of general interest are summarized in the following:

Grain Processing

Special procedures for wet-milling of soft, moldy, and heat damaged corn have resulted from the studies of the industrial processing of corn made at the Northern Regional Research Laboratory. Particular attention was given to the steeping operation which softens the corn and allows the separation of the starch, germ, and protein fractions. Microscopic and chemical examinations showed that sulphurous acid in the steep water exerted a specific action not equalled by other mineral or organic acids.

Thin section of corn kernels were steeped under various combinations of sulphurous acid concentration and under various durations of steeping. It was demonstrated microscopically, that when corn kernels are subjected to sulphurous acid steep, considerable break-down and dispersion of the protein is effected. The higher the sulphurous acid content and the longer the steeping period, the greater was the amount of break-down.

Research and production workers in other grain processing industries showed such interest in the results with corn that the need was apparent for similar studies with other grain.

Cannery Wastes

Waste material from the processing of pears and asparagus can now be converted into useful products, as demonstrated by the Western Regional Research Laboratory. Canners and food-freezers are thus offered a practical solution to some of their problems of stream pollution and waste disposal.

In cooperation with a cannery at Olympia, Wash., pear waste was used as a nutrient for yeast feeds. Using commercial-type equipment, the operating problems of yeast recovery and fermentation were successfully solved. Prior to fermentation, it was necessary to separate the pulp from the juice, and suitable equipment is being designed for this purpose. The yeast produced had a high protein and vitamin content to indicate its value as a poultry and stock feed ingredient. The cannery waste from pears alone amounts to about 96,000 tons annually. This tonnage converted to yeast would yield 3,000 tons of a concentrated feed having an estimated value of $600,000.

It was also found that a concentrated juice prepared from waste asparagus butts made an excellent medium for growing a number of useful microorganisms. A process for the production of juice concentrate on a large scale was developed and tested to a point that demonstrated its commercial feasibility. Among the organisms grown on asparagus juice was *Bacillus subtilis*, which was discovered to yield a new antibiotic that was named subtilin.

Lard Preservative

Industrial promise of protection against rancidity of lard and other fats is shown by the use of lauryl gallate. Studies undertaken by the bureau's pharmacol gy laboratory show that this compound has excellent anti-oxidant properties. Lauryl gallate is soluble in fats and its protective action against rancidity is carried over, to a large extent, into baked goods of the pastry type with the exception of those bakery products made with bicarbonate of soda (such as soda crackers). Present indications are that this compound is not toxic in amounts many times greater than those proposed for use as an antioxidant in fats.

Northwest Advances in Canning and Freezing

Improvement in the color of commercially canned freestone peaches is made possible as a result of processing methods developed by the fruit and vegetable products laboratory at Pullman, Wash. These methods provide for the removal of gases entrapped within the fruit tissue and reduce to a minimum the discoloration by oxidation during processing.

Flavor and nutritive studies of freestone peaches during canning and freezing were completed at the Washington State Agricultural Expermiment Station. Fruit permitted to become soft-ripe on the tree was found to be no more flavorful or nutritious than fruit harvested when less mature and permitted to soften in storage before processing.

A completed 2-year study on the canning and freezing technology of Idaho-grown vegetables, in cooperation with the Idaho Agricultural Experiment Station, demonstrated the suitability of the Palouse area for the production of peas on a limited-season basis. Golden Cross Bantam corn was found to be the variety best adapted for the Lewiston area from the standpoint of yield and quality.

Dehydrofreezing

Continued research with dehydrofreezing at the Western Regional Research Laboratory demonstrates that peas and apples can be processed without impairment of quality. The dehydrofreezing process was first described in FOOD INDUSTRIES' feature article of May 1946 with application to carrots, potatoes, cherries, apricots, and boysenberries. The process includes partial dehydration, to remove a large part of the moisture, followed by quick freezing. Storage, transportation, and handling costs are decreased by the reduction in weight and volume of the food before freezing. For peas and apples, the maximum weight reduction that can be achieved during the preliminary dehydrating, without impairing the quality, appears to be 50 percent of the weight of the prepared raw material.

The culinary quality of dehydrofrozen peas is comparable to that of freshly shelled peas and equal to that of peas subjected to the conventional method of freezing preservation. This was shown by results of preference tests made with a trained taste panel.

Excellent pies were made from dehydrofrozen apples. The texture and flavor of the fruit in the pies were essentially equal to those in

(*Continued on page* 216)

WITH MODIFICATIONS this ice cream truck serves as a highly satisfactory unit for retail distribution of frozen foods.

Ice Cream Trucks Serve In Frozen Food Distribution

Refrigerated, fully insulated small trucks, originally designed for retail ice cream delivery, serve a similar function for frozen foods

MODIFIED ice cream bodies provide a good medium for truck distribution of frozen foods, judging from the experience of Raith Bros. Produce Co., which distributes Dewkist and Frostcraft frozen foods within a 30-mile radius of St. Louis, Mo. With such bodies, frozen foods loaded at zero deg. F. do not exceed the safe maximum of 5 deg. rise in temperature if returned after eight or nine hours on a delivery route.

Batavia Bodies

These modified ice cream bodies were built by the Batavia Body Co., Batavia, Ill., and are mounted on two Dodge 1½-ton trucks. These are used to distribute the two lines of frozen foods to independent retail grocery stores, restaurants and retail bakeries.

Deliveries are made in St. Louis and in the surrounding suburban territory. On the east the 30-mile radius extends to the towns of Alton and Edwardsville, Ill., and on the west to Kirkwood and Des Peres, Mo.

Selling Method

The Raith Bros. trucks are operated on the peddle system. That is, each driver-salesman takes out a full load of the items he believes he can sell. He covers his route and brings back what he has not disposed of. The company considers the peddle system superior to the direct sale method of delivery. In the latter, only goods actually ordered by customers are loaded into the truck body and the truck covers a direct route to serve only those customers. It returns empty unless there are cancellations. There are certain advantages and disadvantages in both methods.

In the direct-sale method, the route mileage is liable to be less than with the peddle system because no stops are made except those where deliveries are made. On the other hand, the truck body is not likely to be fully loaded on the direct sale method. This is due to the general practice of serving certain customers on certain days of the week. If these customers do not order sufficient items to make up a full load, the truck must go off route if a full load is carried.

Advantages

The peddle system has the advantage of enabling the driver salesman to increase the deliveries to those customers who make unexpected demands. There is danger here, however, of exhausting the load before the last intended customer is reached.

On the other hand, when deliveries are less than expected on the

peddle system, the truck might carry a part of the load around all day and finally bring it back to the plant at night. When this occurs, the truck refrigeration must be adequate to prevent the temperature of the returned frozen foods from rising to more than 5 deg. F. if loaded at zero.

Adequate Refrigerator

On the Raith Bros. routes of from eight to nine hours, the cold hold refrigeration of the Batavia bodies is adequate to hold the returns at 4 to 5 deg. On extremely hot days, the temperature of the returns may reach, but not exceed 8 deg. These temperatures are obtained through the use of a body that is both insulated and refrigerated. The outside dimensions of the body are 152 in. length; 82 in. width and 81 in. height. This size body is suitable for mounting on an 160-in. wheelbase, Dodge 1½-ton chassis.

The inside dimensions giving the load-carrying capacity of the body are 127 in. length; 68 in. width, and 36 in. height. This is sufficient to hold 4,000 lb. of frozen food packages or 680 gal. of ice cream. The body is insulated with 6 in. Fiberglas in the walls and roof and 6 in. cork in the floor. The outside roof is of metal.

Access to the body interior is by means of refrigerator-type doors, 20 in: wide by 28 in. high, two on each side. The bottoms of these doors are 45 in. above the ground.

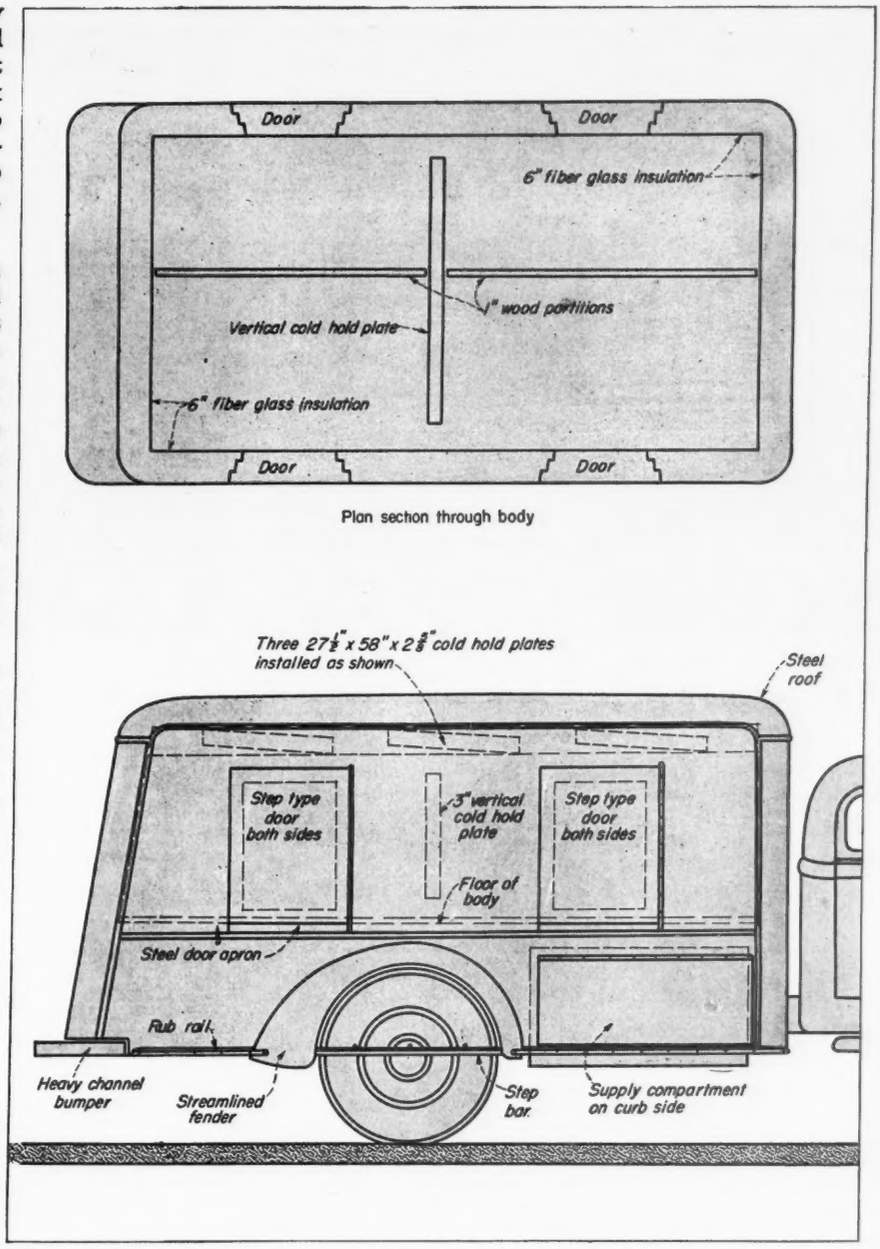
Body Construction

The interior of the body is divided into four sections by means of a vertical transverse Kold-Hold plate and two 1-in. vertical longitudinal wood partitions. These partitioning members are not located on either the transverse or longitudinal centerlines of the body so that the four sections are not all of the same size.

The two front sections are of the same length, 66 in. but not of the same width. That on the curb side of the truck, which is the easiest and safest side to unload from, is 38 in. wide and that on the street side, 29 in. The two rear sections are of the same widths as the front sections but only 58 in. instead of 66 in. long.

The body refrigeration is provided by four cold hold plates, the transverse one previously mentioned and three others hung under the ceiling of the body. Each of these plates is 58 in. long and 27½ in. wide. The three ceiling plates are each 2⅝ in. thick and the center plate, 3 in.

The cold hold plates may be regenerated in several different ways. In this case they are refrozen each night by backing the truck up to the company storage box and circulating ammonia brine through them from the storage box Frick system.



TOP DRAWING shows division of truck body by Kold Hold plates and two wood partitions. The lower section illustrates how interior wheel housing is eliminated.

Standard Departures

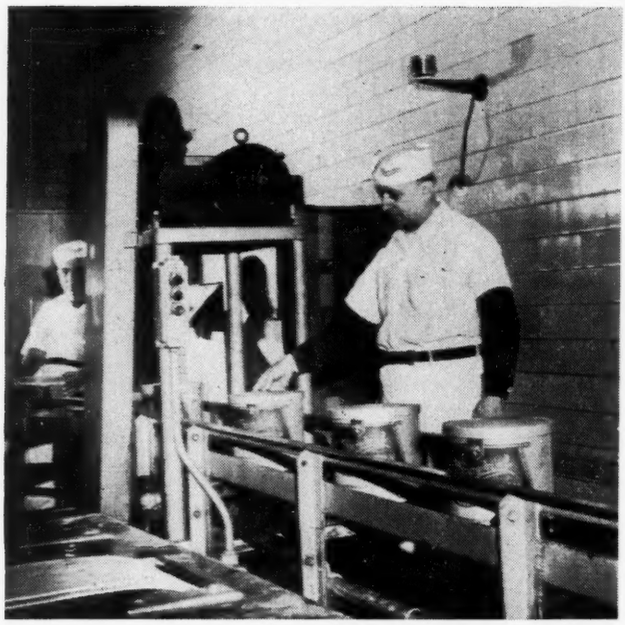
The modification of the standard Batavia ice cream body to suit the Raith Bros. requirements for handling frozen foods, includes the number and location of the cold hold plates, the non use of the two compartments below the floor of the body, one on each side of the truck, and the roof rails on the outside top of the body.

If mechanical refrigeration is used on the body for ice cream deliveries, the street-side compartment below the body floor is used to mount the small gasoline engine and the refrigerating compressor, and that on the curb side for supplies or empty cans. With ice cream deliveries, they are painted all white. This includes the motor hood radiator shell, truck cab and the entire body, including the roof and the roof rails. The front fenders are black and the wheels are red.

In the operation of the Raith Bros. trucks as shown herewith, both the loading and unloading are done from the sides, as there is no door at the rear. Each of the four sections into which the body interior is divided is served by its own door, two on each side of the body.

With the bottoms of the doors 45 in. above the ground, much of the load can be handled by a man standing on the sidewalk, or street. With those portions of the load that cannot be so reached, the rub rail notch step and a step bar extending across the fender opening at the level of the rub rail, may be used.

VAPORIZER installed in the flavor-mixing section of the Cardani Ice Cream Co., Long Island City, N. Y.



PROTECTION against flies entering through the loading doors is maintained in the bulk filling department.

Continuous Fly Control

New device vaporizing pure DDT is claimed to give continuous protection against the common housefly. One unit vaporizes less than one gram in 24 hour period to protect 20,000 cu. ft. with invisible, odor-less particles

AN electric vaporizer using pure DDT is now being introduced in the U. S. as an insecticidal device to give continuous control of the common housefly. Installations were made recently in the New York area in several food processing plants, restaurants, and other food establishments.

Manner of Operation

The mechanism operates noiselessly and the insecticide is odorless. Immediately after installation, however, there is an apparent sweet odor for two or three days. The DDT is not dissolved in an oily vehicle or made into a watery emulsion. Consequently it does not stain or form residues of uneven amounts. The fine vapor is so small in particle size that it is almost invisible yet effectively permeates the atmosphere to kill any fly, moth, or mosquito.

Invented in England, the device was first used to vaporize germicidal agents and was successfully utilized to purify the air in bomb shelters. Adaptations made the device suitable, using the same principle, for vaporizing insecticides. This vaporizer is called Aerovap and is furnished on a rental basis by the American Aerovap, Inc., New York City. It consists of a cup-like receptacle built on the end of a twelve-inch aluminum bracket which can be fitted to a wall and plugged into any AC or DC electric outlet. The receptacle contains an aluminum cup of about 20 cu. in. capacity into which is placed pure crystalline DDT plus an inhibitor to prevent decomposition. The cup rests on a thermostatically controlled heating unit which heats to 266 deg. F. This temperature melts the DDT and vaporizes it into the atmosphere. Twenty-four hours of continuous operation will vaporize less than one gram into the air. For positive fly control, it is recommended that one device be installed for each 20,000 cu. ft. of space.

Industrial Uses

The Mrs. Wagners Pie Co., Brooklyn, N. Y., has installed two Aerovaps in a large room, opened to the outdoors at one end, where the peelings of apples are placed before disposal. This installation kills the flies at their source of attraction and keeps them from breeding and entering into the main part of the plant where the baking operations are carried on. Another device has been installed in the retail store located in the front of the building. In England, retail stores have successfully used this system to control flies during the last several years.

At Loading Platforms

The Cardani Ice Cream Co., Long Island City, N. Y., like any other food plant, endeavors to keep flies outside when doors are opened for loading operations. To handle those flies that do get inside, three units have been installed in their manufacturing room located on the first floor adjacent to the loading platform.

The Henry Heide Confectionery Co., New York, has installed two units in a part of their plant where fondants are heated and prepared in the manufacture of bar candies.

The convenience of starting the device in operation by switching on the electric current is quite apparent as compared with the use of traps, poisons, sprays, fly papers, or by swatting.

(*Continued on page* 210)

EDITORIALS

COMMENT AND OPINIONS

Strikes as Usual

PRINCIPAL lesson from the meat strike is that some labor unions have not yet come to their senses. The packers offer of a 9-cent per hour increase was based upon a cost of living increase justifying 8.5 cents per hour higher pay than was granted in June, 1947. Two unions signed contracts for 9 cents per hour more, effective January 12. These were the AFL Amalgamated Meat Cutters and Butcher Workmen of North America and the National Brotherhood of Packinghouse Workers CUA. The CIO-United Packinghouse Workers of America, which called the strike, first asked for 29 cents per hour, and then held out for 19 cents.

This demand obviously was unreasonable. The U. S. Bureau of Labor Statistics reports a 67½ percent increase in consumer prices from January, 1941, to January, 1948. Average earnings of packinghouse employees, as reported by Swift and Co., increased 82½ percent during that period. Average hourly earnings of employees in all manufacturing industries for January 1948, were $1.29, compared to $1.37 at Swift before the 9 cent increase agreed to with the AFL and Brotherhood unions.

CIO-UPWA apparently follows the old union philosophy of getting all you can by swinging the big strike stick. And to blazes with what is just or what damage is done to the economy and the consumer through inflationary wage boosts. When will union labor learn that it, too, pays the higher prices which it creates?

Thanks to F.&D.A.

THE problem of bleaching and aging flour has been a difficult one, because of real and justified concern at Food and Drug Administration. Results obtained in England indicated apparently a dangerous result with dogs fed heavily on bread made from flour prepared with Agene. At once suspicion arose as to whether there might not be comparably dangerous results for human beings. Some of the more spectacular interpretations, fortunately wholly unjustified, had half of America running around like mad dogs.

F&DA properly investigated. But it exercised restraint in applying remedies until all the facts could be appraised. Fortunately there appears to be no serious acute effect with humans. Until current research is further along, it is not known whether there is any danger at all when Agene-treated flour is used in the human diet.

But the British results have raised a question in the minds of many as to the suitability of Agene treatment for any flour. Rightly, strenuous efforts are being made to develop substitute chemical treatment which will age the more difficult types of wheat and permit prompt milling of a satisfactory white flour. The industry cannot afford to continue the use of any chemical which causes suspicion in the public mind of the safety of the products it sells.

We anticipate new chemical developments that will adequately relieve the milling industry from any suspicion and surely protect the public. It is most fortunate that F&DA has maintained and pressed research to this end. Meantime it has been careful to avoid premature, needlessly harsh rulings.

Cooperation on matters of this sort is more than important. It is vital for the good of the public generally. It is to official credit that we have had it, and to the benefit of all. The whole problem will be finally solved as the flour standards are further considered.

"Piloting" New Processes

ORDINARILY it is a long step from laboratory production of any product to its commercial exploitation. Usually the second step in a product's development is its manufacture in a pilot plant, which is one way to keeping mistakes small so that profits may be large. But there is a more important function in a pilot plant. Its primary purpose is to discover the engineering problems that must be reckoned in the full-scale commercial production. And here is the place where it is cheapest to work out the bugs in the process.

Although the foregoing principle is well-known to most process engineers, there was one notable exception to the general practice in recent years. During the war, synthetic rubber was so urgently needed that full-scale plants were constructed without going through the customary piloting — and we all know that the daring jump was successful.

On the other hand, during the war an unidentified food process got only as far as the pilot plant, and despite much effort and expense it could not duplicate laboratory results. In food processing we are so accustomed to easy transition from kitchen-scale operations to the commercial-scale that this incident is not easily explained. Nevertheless, it shows clearly the value of testing out the intermediate step.

Piloting should always be done where a process is new and untried.

Boon to Foreign Trade

HISTORY was made in international relations when 53 nations (Argentina significantly not included) approved the International Trade Organization charter at Havana. This charter maps a new and smoother path for world trade and economic cooperation. It probably will be more than a year before the charter is ratified by the governments of the required 20 nations, and its effects will not be fully felt until the Marshall Plan is concluded. But if the world continues at peace, the ITO eventually should be highly beneficial. By minimizing the use of tariffs, preferences, subsidies, import and export quotas and other world trade restrictions, it will avoid serious economic warfare. It also will enable other countries to produce goods which they can

sell to us for dollars that can be used to buy from us without loans or gifts.

Several temporary concessions were made by the United States to "undeveloped" countries to aid their industries and to dollar-short countries to help their balance of trade. In turn, the U. S. is permitted to continue its farm export subsidies and its import quotas incidental to agricultural price-support programs.

In the long-run, more free exchange of trade among the nations of the world will build new markets for processed foods. As the various countries develop their industries, the buying power of the people will increase proportionately. Then there will be more who can afford to indulge in the "luxury" that American processed foods now means to them.

Some of the countries, of course, will develop their food industries further, and will compete in world markets with our foods. But with our head start in efficiency and quality, we should more than hold our own, except, perhaps, for a few specialties.

As a matter of fact, there would be a much greater foreign market for American canned and other processed foods now if trade barriers were not in the way.

For LIFO Inventorying

LIFO (Last In, First Out) method of accounting of inventory values has met the displeasure of William Gomberg, director of the management engineering department of International Ladies Garment Workers Union (AFL). Speaking before the National Association of Cost Accountants, he made it clear that (in this period of inflation) the unions want the employer to use methods of accounting that will make their apparent profits as large as possible. That method would, of course, lend strength to labor's contention that employers can pay much higher wages.

It would be interesting to hear Mr. Gomberg speak on his recommended accounting procedures after a long period of price declines. No feat of imagination is required to visualize his probable reaction should an employer plead inability to pay a wage increase and show Mr. Gomberg's recommended First In, First Out inventory figures to support the argument.

Except from the viewpoint of the income tax collector or labor leaders who want to squeeze money out of a corporation, the LIFO principle of handling inventories is one that merits everybody's support.

Feeding a Bigger Army

Recent talk of war and the clamor for increasing the number of men in the armed services bring up the question of military food requirements. Having just successfully handled the wartime job of feeding 13,000,000 men, the Quartermaster Corps is in a position to take the food procurement job in stride. And the civilian economy is in a good position to feed larger armed forces. Since the war, the civilian population has maintained almost its wartime pattern of high food consumption quantitatively and qualitatively. And, of course, more men in the military forces would not increase the number of stomachs to fill. Only in the event that specially packaged foods were needed for large numbers of men overseas, or for combat troops, would there be much effect on food processors. As the military man power is increased, however, there will be a proportionately larger requirement for food in institutional-size containers.

Perhaps the most serious factor involved in a shift to a state of real military preparedness will be the demands on the metal and equipment industries. In the event of full or partial industrial mobilization, the customary supplies of things needed in the food plant would become tighter. So if it should become apparent that a serious situation lies ahead, you would do well to get in your orders early for anything you may need.

Adding Value to Waste

In normal times, the food processor often faces the economic problem of increasing the value of his lower grade products so as to realize more income from their sale. This is especially true of inedible byproducts. These often are sold for ridiculously low prices in comparison with the cost of the primary raw material.

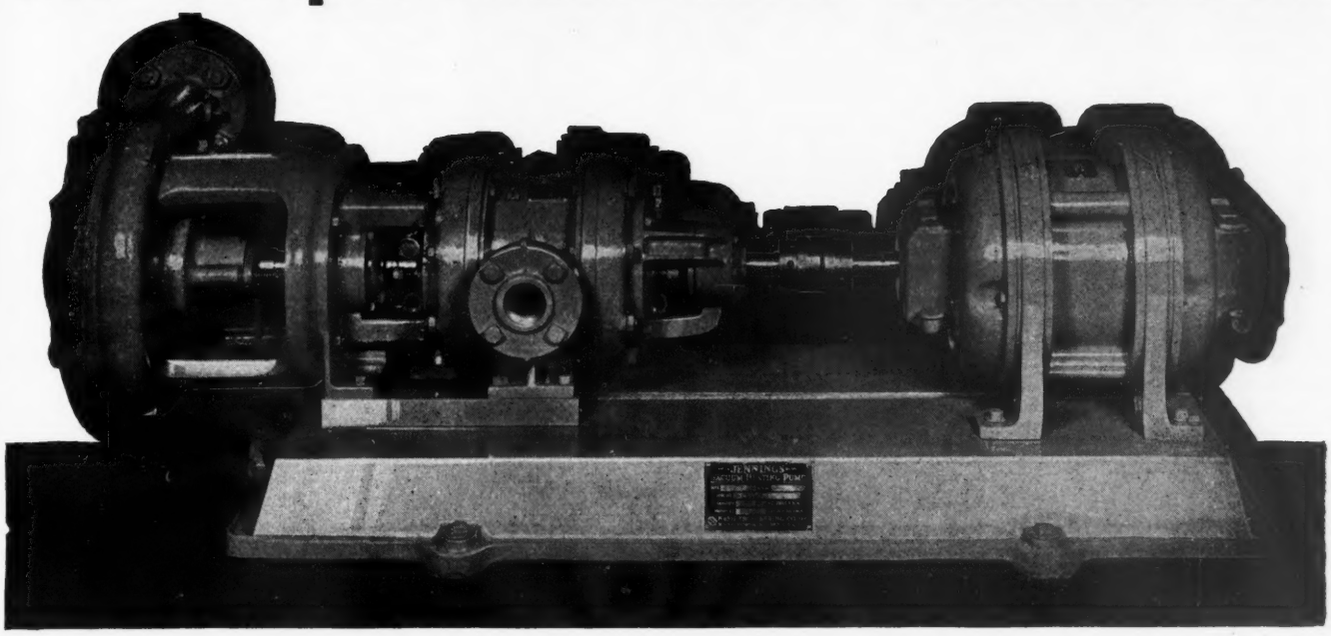
One such valiant attempt is the utilization of low-grade coffee beans by Coffette Products, Inc., Brooklyn, N. Y., to produce a shampoo. If the venture is successful it will undoubtedly benefit Latin American coffee growers and may ultimately result in a tiny reduction of higher grade bean prices. But that is beside the point of this comment.

Primary food processors of the U. S. A. should constantly be on the search for comparable methods of converting waste materials into higher values. A few leading firms like Borden, Armour, Quaker Oats and Corn Products Refining Co. have long been active in this direction, but most of the food processors have not realized their opportunity, nor even started the necessary research to exploit the potentialities.

Refrigerator Cars Needed

Government men say that the demand for refrigerated transportation for frozen food far exceeds facilities available. Refrigerator cars able to maintain 12 to 20 deg. F. appear to be in greatest demand. Railroads apparently are resisting the trend to mechanically refrigerated equipment on the rails. They insist that only ice and salt can furnish this class of service. Reluctance to accept new developments apparently comes originally from those who do not wish that the present car-icing companies have less business. Mechanical refrigerating units seem unable to make much progress in car equipment against this resistance of rail-affiliated enterprise. But at least one new type of iceless car is promised for first rail trials this spring.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

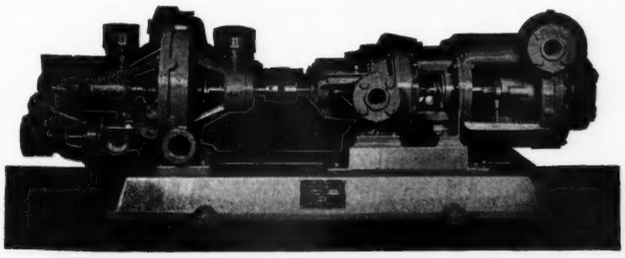


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

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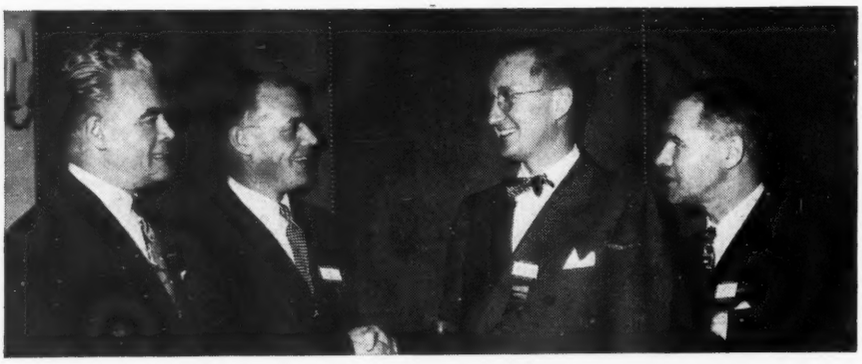
CONVENTION REPORTS



New president of National Association of Frozen Food Packers, F. J. Becker, (left center), is congratulated by the retiring president, C. Courtney Seabrook. Looking on are Howard Lochrie of Birds Eye-Snider (left) and Lawrence S. Martin, secretary-treasurer of the Association.

Bright Outlook for Frozen Foods Reported at Chicago Convention

Inventory situation improved by smaller 1947 pack. Plans announced and technical problems discussed.

CURES for what ails the frozen food industry were outlined by speakers at the Chicago convention of National Association of Frozen Food Packers, March 15 to 18. Recalling that the industry is too painfully aware of what has taken place in the past 18 months, C. Courtney Seabrook, president, reported that inventories had been brought back into balance and that shortages may exist in certain items before new packs can be marketed.

Better Balance

The effort to bring inventories into balance brought about cutbacks to a production of about 700,000,000 lb. of frozen fruits and vegetables in 1947, compared to 900,000,000 lb. the year before. A preliminary tabulation of 1947 packs of frozen vegetables shows a production of 345,-167,259 lb., 23 percent below 1947. The frozen fruit pack amounts to 347,251,207 lb., about one-third less than a year earlier.

This year the industry is expected to resume its upward trend, according to Mr. Seabrook, and may surpass the record packs of 1946.

Among developments which will help the industry is a campaign for informative labeling and for industry-wide acceptance of standard labeling practices. A consumer education program already is under way and will be intensified by the establishment of a test kitchen, issuance of periodical newsletters, and an information service to cooking editors of newspaper and women broadcasters. A laboratory for technological investigation has been established in Washington, together with a consultation service for frozen food packers.

Improved shipping facilities for frozen foods may be provided by the "split absorption" refrigerator car, which uses ammonia instead of ice and will keep frozen foods at even temperatures in transit. (See FOOD INDUSTRIES, July, 1947). Fruit Growers Express is building cars for a pilot run this spring, and they will be tested by four cooperating railroads.

Look to Standards

The forthcoming establishment of standards for frozen foods by the Food and Drug Administration is reported as another favorable factor in the industry.

Some increase in frozen food buying was prophesied as the result of the sale last year of more than 500,000 home freezers and 4,000,000 home refrigerators, all with frozen food compartments.

Technical problems of the industry were discussed and new developments reported by several speakers. One of the outstanding papers was that on the improvement of frozen foods through microbiology and sanitation, presented by Dr. B. E. Proctor and printed in part elsewhere in this issue. Highlights of other papers follow:

Packaged Fish

Technological problems of preparing frozen packaged fish were discussed by J. M. Lemon, Chief, Technological Section, Division of Commercial Fisheries, Fish and Wildlife, U. S. Department of the Interior. One frozen fish fillet packer has minimized air space in the package by molding the fillets into a slab by means of a machine. The width and thickness are standardized and the lengths cut to fit into a standard 1-lb. package. Larger packages are prepared by including several 1-lb. sizes in 5 and 10-lb. packages for the institutional trade. The slabs of fish are first covered with waxed paper, then an outside wrapper of attractively colored aluminum foil. This makes a tightly sealed package which resists the loss of moisture and the action of oxygen of the air very effectively.

Enzyme Action

Discussing problems of freezing, Mr. Lemon reported observations which indicate that there is a relation between enzyme action and "drip," regardless of the rate of the original freezing. There may have been too much emphasis on rate of freezing in the past. This is a problem which deserves considerably more study and investigation, and if possible, a real definition of the term "quick frozen" should be evolved.

The idea of enzymatic action causing an increase in the "drip" in frozen products comes from the fact that enzymes remain active even at very low temperatures. Physical chemists have evolved a definite formula for the rate of this action at very low temperatures. It is expressed as doubling for every 10 deg. rise in temperature, and is employed in estimating the storage life of frozen food products. For example, a food product which will remain in marketable condition in storage for 6 months at 0 deg. F. will be in good condition only 3 months at +10 deg. F. Fish, meat, and poultry

have not as yet been successfully treated so as to inactivate the enzymes.

Nutrition and Palatability

Dr. Faith Fenton, Cornell University, pointed out that retention of palatability and nutritive value go hand in hand. Conditions conducive to the retention of nutritive value, particularly vitamin C, also are conducive to the retention of palatability.

Vining is found to toughen both the skins and cotyledons of peas. Delay between vining and freezing increased the toughness of the skins; whether peas were hand- or viner-shelled. Most of the toughness develops during the first 4 to 6 hr. of delay. Washing away the vine juice decreases, but does not prevent toughening. Lowering of the holding temperature to 35 deg. F., also decreases but does not prevent toughening; the more mature and the larger the peas the greater the toughening during holding.

Dr. Fenton put in a plea for a thawing indicator in each frozen food package to show whether the contents had thawed and refrozen. She declared that this would be a "shot in the arm" for the frozen food industry.

Poultry Progress

Dr. George F. Stewart, Iowa State College, reported that 130,000,000 lb. of eviscerated chickens was frozen during 1947 under federal inspection, and 70,000,000 to 80,000,000 lb. without federal inspection. He cited progress being made in the handling of poultry in the plants. Immediate evisceration while the birds are still warm avoids absorption by the meat of the viscera odors and flavor. He rated mechanical handling and improved sanitation higher than the method of freezing in improving frozen poultry quality, and called attention to the importance of aging, which is obtained in 8 hr. for chickens compared with several days for beef and which will proceed during freezing. Chilling in slush ice was recommended, although it will entail higher costs because the birds must be taken off the conveyors.

Advantages of Chlorination

Discussing chlorination in frozen food production, William J. Scarlett, Wallace & Tiernan Co., Inc., Newark, N. J., stated that "break-point" chlorination eliminates slime development in plants and on equipment; bacterial contamination on raw product, workers hands and finished product; and bad odors and off-flavors.

He cautioned, however, against the use of chlorinated water as a substitute for good plant housekeeping. These benefits were listed for chlorination:

1. Decrease in cleanup time by as much as 50 percent.
2. Slime reduction in flumes, pipe conveyors, washers and other equipment and on floors, eliminating danger of slipping.
3. Improvement in general plant odors.
4. Decrease to elimination of bacterial counts.
5. Prevention of spoilage and final product contamination.

Becker Elected

The new president of National Association of Frozen Food Packers is F. J. Becker, special assistant to the vice-president in charge of Pacific Coast Operations, Honor Brand Division, Stokely Foods, Inc. H. A. Carpenter, president, Olney and Carpenter, Inc., Walcott, N. Y., was elected first vice-president, and T. E. McCaffray, president, National Fruit Processing Co., Seattle, was reelected second vice-president.

Bakers Face Fewer Problems

ASBE convention shows a return to normal production as many facets of industry are discussed

LESSENING of production difficulties in the baking industry was indicated at the 24th annual meeting of the American Society of Bakery Engineers, in Chicago, in March. This conclusion could be drawn from most of the discussions and from President J. M. Albright's opening address. "The effects," Mr. Albright said, "of many developments inspired by the urgency of wartime conditions have become a permanent part of the industry's present day practice, and they must be evaluated in terms of present day conditions."

A reflection of these developments characterized the part of the program dealing with ingredient selection, production costs, wage rates, equipment replacement, plant operations and product quality to satisfy consumer demand in the face of increasing inter-commodity competition.

Asks Research

A plea for wider and more intensive research study of baking industry problems was made by C. J. Patterson, Jr., C. J. Patterson Co., Kansas City, Mo. He reported a food industry income of $44,000,000,000 for 1947 with only 1-3 of 1 percent spent on research; less than

New ASBE officers from left: Tyler R. Stevens, American Machine & Foundry Co., New York, 2nd vice-president; Harold Moody, Ralph's Grocery Co., Los Angeles, 1st vice-president; Otto Richter, Richter, Richter Baking Co., San Antonio, president; Victor E. Marx, American Dry Milk Institute, Chicago, secretary-treasurer.

Arranging baked foods display at ASBE meeting, from left: Harold Hall, American Dry Milk Institute, Chicago; W. J. Ocken, Chicago, a past president of the society; William H. Hauck, Hauck Baking Co., St. Louis, Mo.; J. E. Crawford, Kraft Foods Co., Chicago, and Roy Kroll, Rogers Bros. Food Products, Chicago.

1-10 of 1 percent in the baking field, which has benefitted mostly from technological advances in other fields.

In his discussion of problem flours, R. J. Clark, W. E. Long Co., Chicago, stated that, "Every bread flour is a problem flour if it is not properly stored before going into production." He explained that every flour passes through a respiration or sweating period during which water vapor and CO_2 are given off at a rapid rate that may continue for as long as a month. For that reason all bread flours should be stored at between 75 and 80 deg. F. until sweating is completed. To get best results in the mixing of doughs, the flour used should have a temperature of not less than 70 deg. F. in the center of each sack.

The importance of proper malting and mixing was discussed by J. M. Doty, Doty Technical Laboratories, Kansas City, Mo., Earl Johnson, Lowenberg's Bakery, Ottumwa, Ia., and Roy Seivers, Cotton's Holsum Bakery, Baton Rouge, La. According to Johnson, a fully developed dough must have proper malt balance. As a dough conditioner, malt plays an important part in gas production and retention during baking. Although dry malt shows less variations than liquid malt, positive controlled temperature conditions are essential when either is used. The panel concurred that proper malt control could be handled by the miller, who could describe and imprint on the bag the properties contained in the milled flour.

Bread Softeners

Softness in bread is not essentially an indication of its freshness, it was pointed out in a discussion on the use of bread softeners, by Dr. Wm. Bradley, American Baking Institute, Chicago, Walter T. Gase, Gase Baking Co., Saginaw, Mich., and L. O. Lucka, Purity Baking Corp., Champaign, Ill. When bread containing softeners, such as lecithin, glyceryl mono-stearate, polyoxine methylene stearate, and other polymers, was tested for compressibility, crumbliness, and sogginess of crumb, softer qualities were apparent than those exhibited in bread made without wetting agents. Controlled bread has taste advantages, however, and a larger volume of excellent bread is produced without the use of softeners. Softening agents must be used carefully, the panel agreed, and much depends on the strength of the flour used. Bradley explained that softeners do not inhibit bread staling.

Machineability of bread dough is determined by mixing and proper fermentation, according to F. W. McCarthy, Vienna Model Bakery, Philadelphia, Pa. Variations in types of flour must be determined either by laboratory analyses or batch-test method. Also, sponge dough is more easily machined than straight dough, which has a tendency to become "bucky."

One Use Bags

Advantages and disadvantages of paper and cloth bags in use as flour containers was the subject of a divided panel of Dr. Betty Sullivan, Russell-Miller Milling Co., Minneapolis, Minn., John A. Larigan, St. Regis Paper Co., New York, N. Y., and Robert Devinny, Textile Bag Co., Chicago, Ill. In listing the advantages of the paper container over cloth or jute, Dr. Sullivan cited: (1) Cheaper initial cost, (2) less moisture loss, (3) higher sanitation in transit, and (4) less susceptibility to infestation. Disadvantages are difficulties in handling, loading and stacking. Cost of one-trip, multiwall paper bags was given to be less than half that of cotton. Satisfactory performance is indicated by the estimate that 60 percent of all flour shipped during 1948 will be contained in paper bags. Devinny, in citing the advantages of cloth over paper as a container material, claims there is a minimum of bursting and leakage in cloth containers and that tests proved they are "perfectly sanitary." Also, that flour ages better in cloth and the resale value of both plain and print, bags offsets their higher initial cost. The panel pointed out that several states have legislated against used print bags as flour containers.

Advantages of pneumatic handling and bulk storage of flour were outlined by Edward Otocka, National Biscuit Co., New York, N. Y., and supported by the statement that such installations are being considered by large companies which have a weekly use of three to four carloads of ingredient materials, such as flour, sugar and dry milk solids. Their advantages include: (a) Better weatherproof and dust-proof control, (b) faster conveying time (20 T. per hr.), (c) lower handling costs, and (d) less nuisance factor in the plant area. Both have wide application in grain milling and have been used successfully in bulk sugar handling.

ADA Looks To Research

Quality control of dairy products and their value in nutrition studied under new grants

STUDIES pertaining to the importance of milk products in both human and animal nutrition, dietary contributions of milk and milk products compared with other foods and research in the quality control of dairy products were given primary attention in the 1947–1948 research program sponsored by American Dairy Association, according to Dr. Robert Prior, Seattle, Wash., in his research committee report at the Ninth Annual Meeting of ADA, held in Chicago.

Member organizations of the association, through its research and executive committees, allocated $96,000 in financial grants to research agencies and individuals in 18 colleges, universities and established institutions in the U. S. during 1947–1948. Since 1941 actual research expenditures totaled over $370,000.

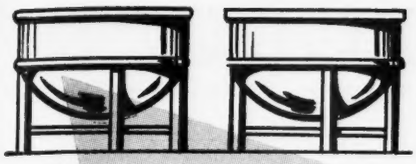
Broad Program

Other allocations approved include: advertising, $733,000; merchandising, $85,000; industry promotion, $70,000; education, $60,000; publicity, $28,000; and administration, $60,000. Total allocations for all budget items amounted to $1,132,000.

In concluding his 8 years as president of ADA, Daniel T. Carlson, dairy farmer of Willmar, Minn. cited the progress in dairy technology and product development made in recent years. As evidence of dairymen's desire to stay abreast of the developments in the industry, he called attention to the tremendous growth in association membership from a representation of 6 states in 1941 to 40 this year, and a total individual membership of over 5,000,000 dairy farmers. Four additional states received membership status at the meeting, including Alabama, Arizona, Georgia and South Carolina.

New Officers

Bryce S. Landt, dairy farmer of Wisconsin Dells, Wis., was elected president of the association, succeeding Carlson who had declined candidacy for another term. Other officers elected were: vice-president, Chester R. Schoby, Bode, Iowa; treasurer, Wilbur J. Swayer, president of Pure Milk Association, Chicago; secretary, William L. Hendrix, Boise, Idaho; and assistant secretary-treasurer, William J. Murphy, Bismarck, N. D.



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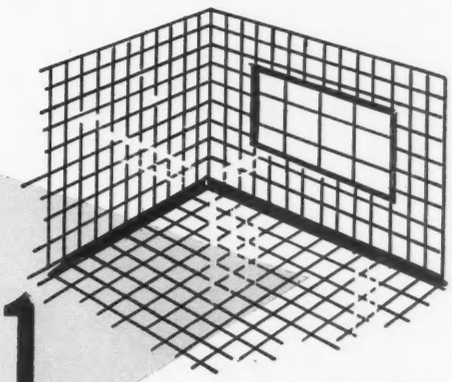

WALLS AND FLOORS

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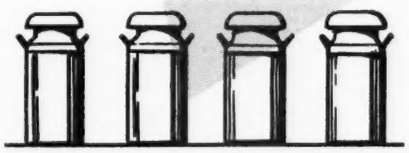
the all-purpose detergent for industry



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Santomerse No. 1 combines cleaning, wetting, dispersing, emulsifying and penetrating action *in one agent*. These qualities make Santomerse No. 1 ideal for cleaning practically all types of equipment, containers and surfaces, including walls and floors.

Santomerse No. 1 is particularly valuable where oily residues must be removed. It makes water wetter, spread faster, penetrate deeper. That's why it loosens up and lifts out all imbedded dirt quickly; then holds it in suspension so it can't settle back and re-soil the cleaned surface. Next it rinses off and out, fast and completely. Furthermore, unlike highly alkaline cleansers, Santomerse No. 1 has no corrosive effect on metal, paint, wood and fabric surfaces.

Santomerse No. 1 for industrial cleaning is furnished by Monsanto in free-flowing flake form. For complete information on its many applications, write to MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri, or contact any District Sales Office. Simply return the coupon if you find it more convenient.

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SERVING INDUSTRY... WHICH SERVES MANKIND

NEW PACKAGES & PRODUCTS

Illustrated Flavors For Ice Cream Packages

AN improved linerless ice cream carton combining individual illustrations of each flavor with appetizing identifying colors has been introduced by the Marathon Corporation. The carton offers new merchandising and display possibilities to help the self-service shoppers• make their flavor selection.

The carton opens easily by lifting a special hinge which tears neatly across the side because of its spot-glued "sawtooth" tabs. A pull on the lid and front side unlocks the specially-designed end panels and the carton lies flat—with slice markers to indicate equal portions. New rounded lock features make it easy to open an end panel for those who prefer to spoon out the ice cream.

Designed with improved die-cutting to prevent binding and with deeper scored lines for free movement, the new carton will work on fully automatic or hand lines.

A special "hard" coating of wax on inside surfaces protects the purity of the ice cream and preserves the carton. "Eggshell" surface wax, which does not rub off, protects the outside, prevents sticking and improves the appearance.

Marshmal-O-Creme

UNION STARCH & REFINING CO., producer of Pennant brand corn syrups, is now marketing Pennant White Seal Marshmal-O-Creme in an 8-ounce glass jar with a sparkling new label. The new label is a four-color, varnished, wrap-around, designed to stimulate sales by direct-photo reproduction of seven appetizing uses in salads, desserts, and confections. Back panel of the label is devoted to five special recipes. The jar has an attractive lithographed cap which carries the slogan "Makes 'most any dessert taste twice as good." For easy identification, the name Marshmal-O-Creme is prominently displayed in red on a white seal—both on cap and label.

A new 3½-pound fiber container of Marshmal-O-Creme is also available for the fountain trade.

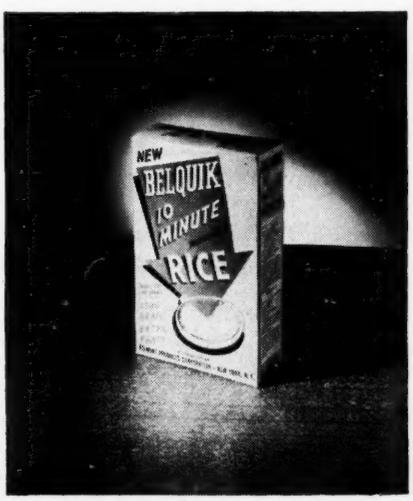
Chocolate Plantations

DISCONTINUED during the war, production of Chocolate Plantations has begun again by the Loft Candy Co. The candy consists of a chocolate coat surrounding a soft center made of dairy butter, molasses, corn syrup, sugar, and flavorings. The product is sold in 8-oz. packages attractively designed with blue, gold, and red against a white background.

New 10-Minute Rice

NEW quick-cooking rice requiring only 10 minutes to prepare, instead of the usual 25 or 30 minutes of boiling for standard rice, is now being merchandized through grocery channels by the Belmont Products Corporation, New York. The new product has been given the trade-name "Belquik 10 Minute Rice" and is attractively packaged in a 14-ounce yellow box with a prominent red arrow as background. Ten-pound bags are supplied for institutional use.

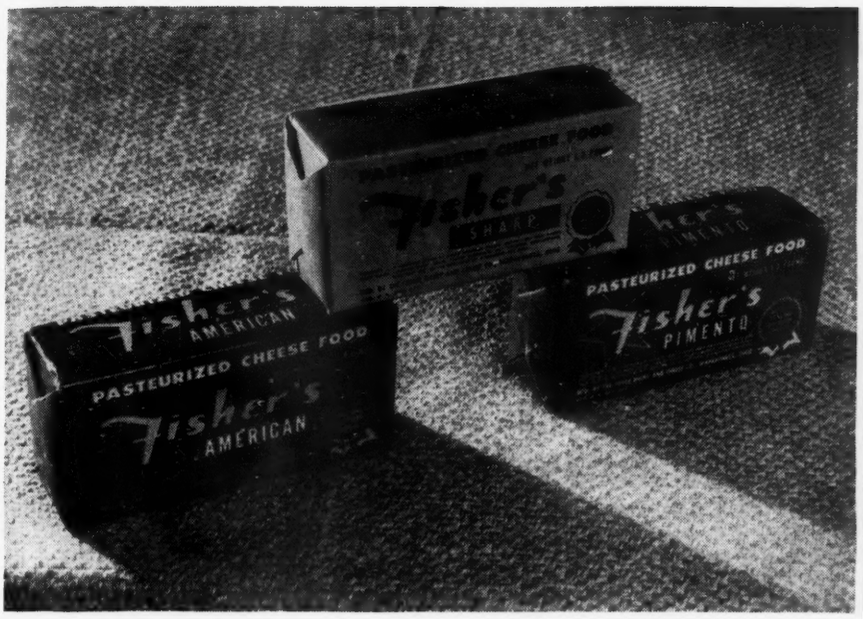
This rice resembles ordinary rice



in appearance, but is not of the precooked variety. It is made under an entirely new process which preserves the vitamins and considerably lowers the starch content. Light, fluffy, whole grained rice can readily be prepared without any particular skill of the housewife. The rice also has the unique property of absorbing the flavors of other foods with which it may be cooked.

The rice was developed to meet the modern demand for speed of preparation without losing any of its flavor or quality.

Idea Service Co., New York, designed the package. Distribution is nationwide.



New Packages For Cheese Products

THE FISHER DAIRY AND CHEESE CO. Wapakoneta, Ohio is now introducing its products on the market in newly designed one-half pound consumer packages. The design is a carton overwrap, lithographed in four bright fiesta colors, on 60 pound stock which is coated on one side with a special varnish. This special varnish is applied on the surface to withstand the heat of the cheese at the time of packing, and to avoid blocking of the packages. The package was designed and produced by Milprint, Inc., Milwaukee, Wis.

Prior to the development of this new package, the Fisher Dairy and Cheese Co. packed cheese only in five and two pound units. At the present time the packages are being marketed in three varieties, American, Pimento, and Sharp. Each has one dominant color combined with the other component parts of the design. A dark blue forms the background for the American variety, a bright red for the Pimento, and a yellow for the Sharp.

The company intends to develop an additional overwrap for its product "Smokey," which will follow the general style and design of the three cheese products already on the market.

Canned Whole Chicken

COLLEGE INN FOOD PRODUCTS CO. has announced the introduction to the grocery trade of its new product, "Whole Chicken Without Giblets." This item has been test marketed in a number of principal cities of the country and has met with good acceptance.

The label is attractive in color, and designed according to College Inn's standards for high priced appeal. Susan Scott, home service director, lists on the back of the label a number of recipes for preparing the Whole Chicken, including: roast, fried, ala king, fricassee, salad, with rice or in sandwiches.

Prominent on the left hand side of the label is a printed invitation to the consumer to "Come on, Taste It!"

College Inn reports that comparative product tests in buyers' laboratories indicate a higher "cut out" weight in Whole Chicken than in any other similar product on the market. This attraction in the product is attributed to the use of "Jumbo Size" fowl.

COMEGYS
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FINE FOODS
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FOOD PACKAGINGS

Comegys Food Corporation of Philadelphia — well-known suppliers of fine foods—is only one of many satisfied users of our Paksure food packagings.

We are equipped to *design and supply* a complete line of packagings for all types of food . . . from nuts to noodles . . . from meats to chocolates. Wraps, bags, envelopes and boxes . . . rolls and sheets of Pliofilm, cellophane, glassine and wax glassine . . . bags and envelopes of wax glassine and cellophane.

For *Beauty, Utility* and *Product Protection* in packagings that sell, consult "experts of long standing" . . . we'll give your problem prompt attention, assure you of good deliveries at fair prices.

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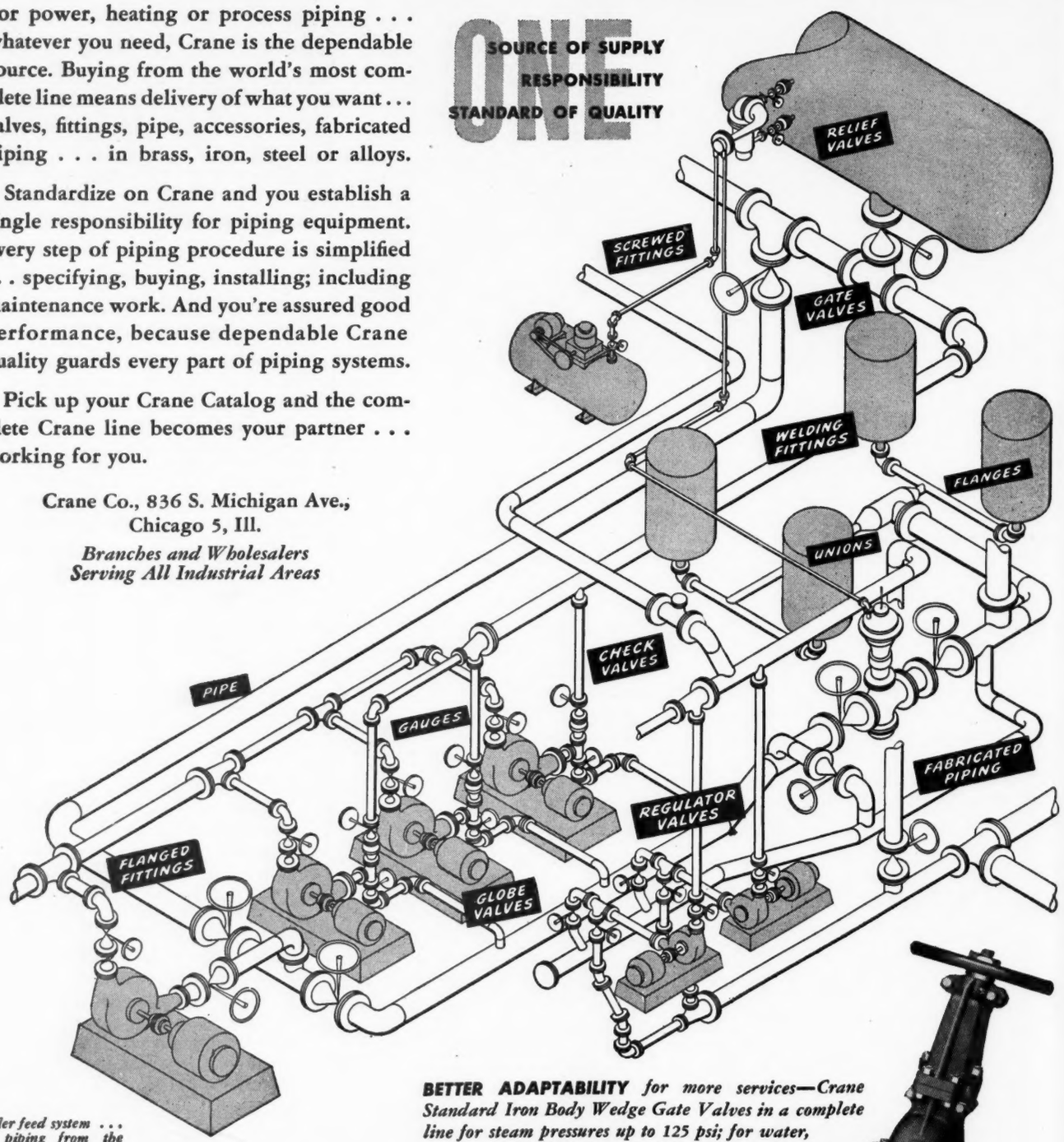

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BETTER ADAPTABILITY *for more services—Crane Standard Iron Body Wedge Gate Valves in a complete line for steam pressures up to 125 psi; for water, oil or gas up to 200 psi. Made in outside screw and yoke, and non-rising stem patterns; screwed or flanged ends; brass-trimmed or all-iron. In sizes 2 in. and larger. See your Crane Catalog, pp 101-6.*

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PIPE • PLUMBING
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CRANE

FOR EVERY PIPING SYSTEM

New Syrup On Market

A NEW institution product, Log Cabin's Wigwam Syrup, is currently being introduced to the nationwide public feeding market by the institution sales section of the General Foods Sales Division. This is the first time this syrup has been introduced to any market.

Research activities with dextrose sugars and amino fractions carried on at General Foods' Central Laboratories in Hoboken, N. J. resulted in the discovery of this revolutionary new "Maple-Del" flavor. The combination of this exclusive artificial maple flavor with pure cane sugar resulted in the new product.

Log Cabin's Wigwam Syrup comes in an easy to open gallon-sized can with a combination of red block and gold lettering against a cream background. General Foods institution salesmen are using one-half pint special cans in introducing the product to the trade.

7-Minit Coconut Pie

6-O'Clock FOODS, INC., Norristown, Pennsylvania, has announced the release of a new packaged food mix containing complete ingredients in one package for quick preparation of a cocoanut pie. All the housewife needs to add to the mix is a specified amount of milk.

The package, "7-Minit Coconut Pie," contains two envelopes. One envelope contains the ingredients for the filling and the other the ingredients for the crust. Necessary flavoring, flour, shortening, sugar, cocoanut, salt, egg, and baking powders are already mixed and blended in correct proportions before packaging.

This is the fourteenth packaged food mix added to 6-O'Clock Foods' line since the war.

Prepackaged Meats Now Machine Wrapped

Wrapped in sparkling cellophane on our Model FF machine, these Hunter packages are virtually self-selling. Suited to super markets as well as the smaller grocery, delicatessen or butcher shop.

No time is lost in preparing Penn Fruit Company's meat for their mammoth show cases. Our Universal 4 machine, installed at the rear of the market, wraps one kind of meat right after another without troublesome adjustments.

Packers and super markets are building brand preference for their products . . . dealers are enjoying faster turn-over . . . and the public is being served better — thanks to attractive and protective machine wrapping.

These eye-catching Hunter packages, for example, are being wrapped in printed cellophane on our quickly adjustable Model FF machine. Designed especially for meats, provisions and frozen foods, the FF has a speed of up to 100 packages per minute, and registers the printed design by electric eye.

Penn Fruit Company's meat products are being wrapped on our Universal 4 machine. This machine features an exclusive SELF-MEASURING PAPER FEED which permits the continuous wrapping of products varying greatly in height. Only one hand-wheel adjustment (for length of package) is necessary. Speeds up to 55 packages per minute.

CONSULT US NOW

about the wrapping of meats or any other products for which you are seeking greater sales appeal or lower wrapping costs. Phone or write our nearest office.

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts

New York Chicago Cleveland Atlanta Denver
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PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

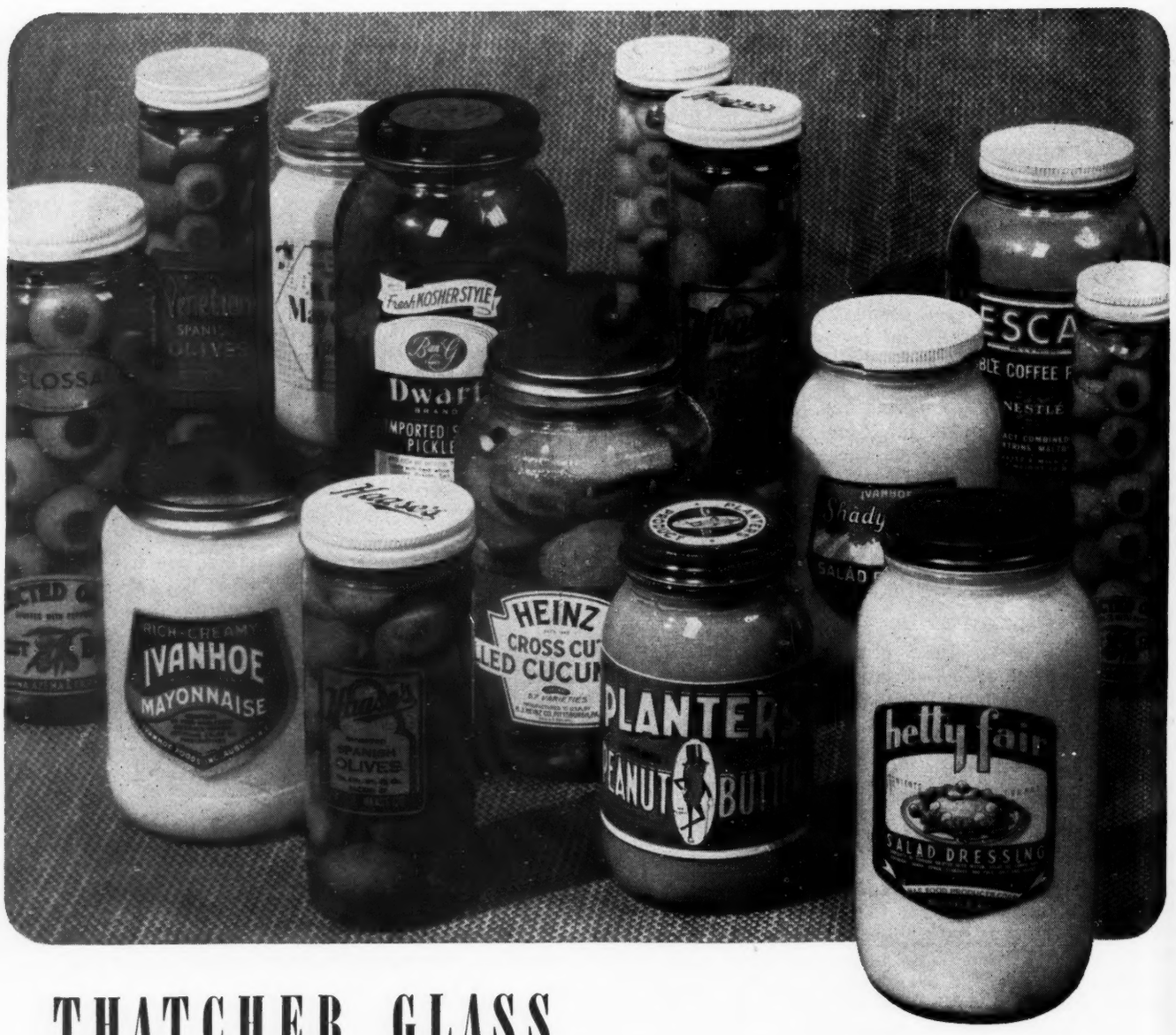
NO OTHER *Container* WILL DO!

Only glass containers will safely protect foods prepared with acids or oils . . . to the extent demanded by consumers. Products, such as pickles and mayonnaise must be packed in glass to sell.

Whatever food product you pack, Thatcher glass jars will bring added appeal for consumers. These sturdy, wide-mouthed jars encourage buying by bringing out the quality, color, and uniformity of your product.

Consumer surveys show an overwhelming preference for foods packed in glass . . . no other container will do. Here is the logical choice for your packaging program: sparkling, low-cost, Thatcher glass containers.

Write us to have the nearest Thatcher Representative call on you.



THATCHER GLASS
MANUFACTURING COMPANY, INC.
ELMIRA, NEW YORK

Creamed Dried Beef

CREAMED, sliced, dried beef is a new product to invade the canned meats specialty field, declares the Can Manufacturers Institute. This recently-introduced meat product is made from cured and processed dried beef, water, dried whole milk, flour, vegetable shortening, salt, and spice. It is packed in attractively lithographed metal cans by Millar and Brothers Company of Philadelphia.

National distribution of the product presently covers 43 states and it is planned to extend this coverage soon to the remaining five.

New Tea Packages

TEA packages are now being made with a reclosure type top. Maxwell House Tea Division of General Foods has introduced the new package to answer the housewife's need for a container that will keep loose tea from spilling, absorbing foreign tastes, or becoming contaminated.

The new boxes, for loose tea and tea bags, are now appearing in a new dress of brilliant orange with white letters. A green block on each face of the package emphasizes the words "black tea" or "tea bags."

Maxwell House Tea is especially blended for the southern taste. Distribution is limited principally to the southern states.

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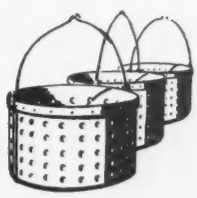
. . . when you use safe yet thorough Oakite cleaners to sanitize equipment. Kind-to-metals Oakite cleaners provide the emulsifying action that quickly softens soils; the wetting action that penetrates soils; the free-rinsing action that leaves bacteria-discouraging film-free surfaces. Oakite cleaners *do not* discolor or etch aluminum. Don't scratch stainless steel, Monel metal, Inconel, nickel and its alloys. Don't disturb tinned coating on copper and steel. For example . . .

YOU CLEAN equipment day-in and day-out with Oakite Composition No. 63—but you won't damage surfaces. You get safe cleaning . . . make germicidal treatment more certain. Oakite Food Plant Digest shows many jobs "63" simplifies.

YOU REMOVE stain from processing and handling equipment with Oakite Compound No. 84M. It thoroughly lifts off bacteria-breeding, dulling stains (vegetable, fruit) but does not injure surfaces. FREE instructions in Oakite 97 Digest.



YOU PROTECT metal equipment (conveyors, retort crates etc.) after cleaning or in storage with easily applied Oakite Special Protective Oil. Dip or brush on. It displaces moisture. Locks out costly indoor rust. Economical. Send for O.S.P.O. Booklet. FREE.

MAKE NO MISTAKE ABOUT IT

. . . safe Oakite cleaners and dependable Oakite methods are designed for specific food-plant cleaning jobs. Why not arrange for a demonstration of modern Oakite cleaning right in your own plant? Contact the Oakite man near you or write direct to Oakite Products, Inc., 26G Thames St., New York 6, N. Y. and we'll have him call. Ask him to bring along a copy of the FREE Oakite 97 Digest—a bookful of cleaning chores you can simplify with Oakite cleaners.

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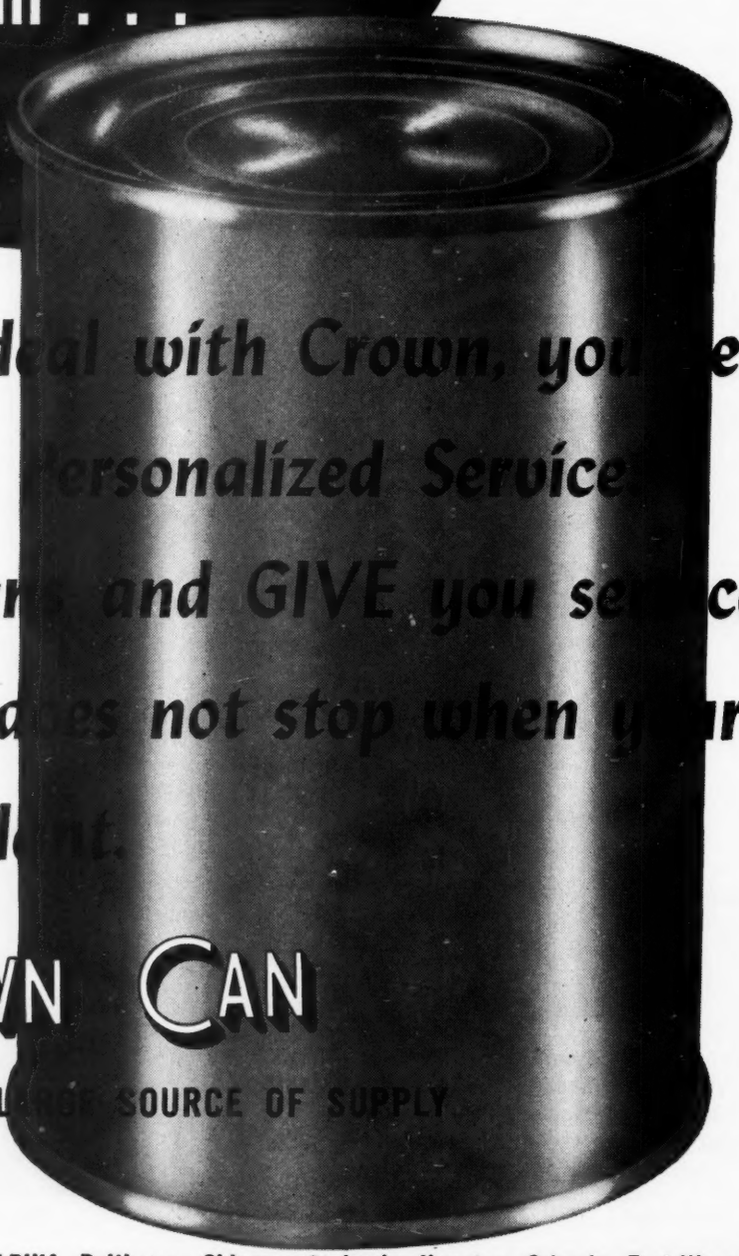
Technical Service Representatives Located in Principal Cities of United States and Canada

cans alone are NOT the entire answer to your problem . . .



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FOOD INDUSTRY NEWS

GENERAL

Packinghouse Workers Strike Traces Slow-Moving T-H Law

Settlement action spread over several months contrasted with steps taken to forestall similar strike in Janr. 1946

THE second postwar strike of CIO packinghouse workers in the meat packing industry began on March 16 in 140 packing houses throughout the country. It involved some 100,000 workers.

The issue involved was the CIO union's demand for a 29-cent hourly wage increase. The industry had settled for nine cents an hour in January with the AFL Meat Cutters Butcher Workmen's union and had offered the same to the CIO.

The first postwar strike, in January, 1946, resulted in government seizure of plants affected. The dispute was settled with the granting of a 16-cent hourly wage increase by the government on the recommendation of a fact-finding panel. The National Wage Stabilization Board then approved price increases to compensate for the wage increase.

Government seizure powers expired last June. This time, President Truman invoked the Taft-Hartley Labor Law in an effort to cope the CIO strike. Truman appointed a three-man board of inquiry to report on the issues in order to permit the obtaining of an injunction. The CIO United Packinghouse Workers of America snubbed the President's request that the workers remain on the job while the board conducted its investigation.

The board, headed by Nathan P. Feinsinger, Professor of Law at the University of Wisconsin and former public member of the National War Labor Board, was to have made its report, April 1, but later was granted an additional week's time. Hearings were held in Chicago with both the management and the union presenting their positions. The other board members are Pearce Davis, of the Illinois Institute of Technology, and Walter V. Schaefer, of Northwestern.

Truman had the authority to seek an 80-day injunction after receiving the board's report. If the issues were not settled after 60 days, a vote would be held 15 days later on the last offer of the management. Five days later the injunction would be dissolved. Any further action would have to come from Congress.

Meat prices went up shortly after the strike began, but soon dropped to pre-strike level in what USDA analysts said reflected resistance of housewives to the high prices.

Salt and Discounts Get FTC Attention

THE Federal Trade Commission, last month, was in action on two fronts of interest to food processors:

(1) It went after the salt producers of the country to see what they have been doing under the terms of an old order against them, and

(2) It took its first steps that may put it in the business of fixing the maximum quantities of a product a producer can use to give an additional quantity price discount.

The FTC again wants to examine the salt companies' prices, terms and conditions of sale, freight rates used to compute delivered prices, and copies of their price lists used since Jan. 1, 1944. From the Salt Producers Association, the government agency asked a detailed description of all activities and services supplied to members, or activities conducted on behalf of members since Jan. 1, 1944.

The FTC is checking up on the salt industry's compliance with an FTC order, effective in April, 1943, under which the companies were directed to "cease and desist" from their admitted combination and conspiracy to fix and maintain the price of salt, and to regulate its production and sale.

The commission asked for the "supplemental reports of compliance" with the 1943 order last September, giving the companies a deadline of November 1. The reports were not filed, however, and last month the FTC served "notices of default" on the companies, which gave them another 30 days in which to file the information and data FTC asked.

Some companies and the Trade Association had filed reports, as requested, as FI went to press. Next step will be for the FTC to examine the information to determine whether or not the reports include the data which the commission sought.

The FTC'S second action is likely to be contested on the ground that the commission has no authority to force submission of company figures.

New Director

JAMES H. MARSHALL has resigned as director of the Sugar Branch, Production and Marketing Administration, to accept a position in private industry. Lawrence Myers, associate director of the Branch, has been appointed to succeed him.

Press Association

SAFETY PICKET LINE

While they were reasonably sure the train would not cross their picket line, these packinghouse strikers at South St. Paul decided a fishing line would be safer.

Blocks Union at New Campbell Plant

THE National Labor Relations Board, in a precedent-making decision, has squelched an attempt of the left-wing CIO Food, Tobacco and Agricultural workers union to obtain, through subterfuge, collective bargaining rights over workers in a new Campbell Soup Co. plant at Sacramento, Calif.

The Board rejected a petition of Mrs. Josephine Froehlich, former paid representative of the International Union, for certification as an individual as bargaining agent for workers in the plant. The Board held, unanimously, that despite her resignation from office on Jan. 2, Mrs. Froehlich was still actually an agent of the CIO union. The union has not complied with the non-communist affidavit provisions of the Taft-Hartley law and thus cannot be placed on the ballot in a bargaining election. Mrs. Froehlich was still a paid official of the union when the board intervened in the case on Dec. 1, although hearings in the matter were held in January after her resignation.

Her contention that she would represent the workers as an individual and not as an agent of the union was contradicted by an employee, member of the AFL, who testified that Mrs. Froehlich told a union meeting in December that she would act on behalf of the CIO union in an effort to circumvent the Taft-Hartley Law. This was not denied by Mrs. Froehlich.

The Board directed an election be held among 200 production and maintenance employees, but limited the choice to no union or the cannery and Warehousemen's Union, Local 857, affiliated with the AFL's teamsters.

New Price Supports Unlikely This Year

WITH Congress moving day by day nearer adjournment, the prospects for a new revised price support law for food products become dimmer.

Most likely outlook conceded by food experts in Washington is for continuation of the present farm price support legislation There may be amendments to give the Department of Agriculture some discretion on supporting the Steagall commodities, which it is now required to support at 90 percent of parity.

This means that price support at 90 percent of parity would be mandatory through 1948 on the basic crops —corn, wheat, rice, tobacco, peanuts used for nuts, and cotton (92½ percent). The Steagall commodities that may lose their mandatory status are hogs, eggs, chickens over 3½ lbs. live weight, turkeys, milk and butterfat, dry peas of certain varieties, dry edible beans of certain varieties, soybeans for oil, peanuts for oil, potatoes, sweet potatoes, and American-Egyptian cotton.

The farm bloc congressmen and the farm organizations, the most powerful influences in deciding price support legislation, have been split over the proper strategy. Most agree that an overhaul of the price support policy and program is necessary. But there are wide differences as to what kind of price support machinery is most desirable and how soon it should be written into law.

On timing, world developments and congressional psychology have worked out in favor of those who contend there is no rush in getting a new model price roof over the farmer's head The economic weather is wonderful, from the farmer's viewpoint. Hence many legislators would like to take their time, hear from every possible interested party, and study every suggestion very carefully before settling down to writing a bill.

On the other side of this timing debate are those, including Secretary of Agriculture Anderson, who believe that now—when the farmer isn't in immediate need of help—is precisely the time to change the government's price support policy They fear that if the price support laws are not changed before they must be changed, the result will be poor legislation both from the farmer's and the country's viewpoint.

This attitude has been stronger in the Senate's agriculture bloc, and the result is the writing and consideration of a long-range farm bill, which includes a new parity formula and new price support levels.

The bill, product of Senator Aiken's agriculture subcommittee, which held extensive hearings on the subject over the past months, would support the basic commodities between 60 and 90 percent of parity and provide no mandatory price support for fruits, vegetables, meat, dairy products and other non-storable commodities.

The House, on the other hand, has been several laps behind the Senate in writing price support legislation.

With no strong pressure from the farm organizations for legislation this session, politics is almost sure to bring the clincher into play: Why pass new price laws now, the Republican leadership asks, when a change is bound to hurt one or more groups of farmers and lose us votes?

"AROUND HERE, McCANN, WE DON'T WORRY ABOUT GAME LAWS."

Bakers Institute Plans Training in Sanitation

ORGANIZATION of an "In-Plant Training" program in bakery sanitation, which will include detailed inspection of participating bakeries and recommendations for corrective measures in plant sanitation, has been announced by Dr. Edward L. Holmes, Director of Sanitation, American Institute of Baking, Chicago.

Sponsored by the Institute's sanitation department, the field training program will supplement the short courses. Written bulletins in bakery sanitation, offered in addition by AIB, are intended to instill a better understanding of proper sanitation practice among plant employees through their participation in the program. Although AIB will not initiate the recommended corrective measures, it will repeat plant inspection at regular intervals to determine the effectiveness of the sanitation procedures undertaken by the bakery.

Detailed inspection of bakeries participating in the training program will be made by Louis A. King, newly-appointed staff member of AIB, who for the past 5½ years served as sanitation inspector with the Food and Drug Administration. Following King's inspections, recommendations for plant sanitation measures will be made through the sanitation department of AIB. Facilities for allowing a larger number of bakeries to participate will be expanded as the program gathers momentum, and some vacancies are expected for the latter part of 1948.

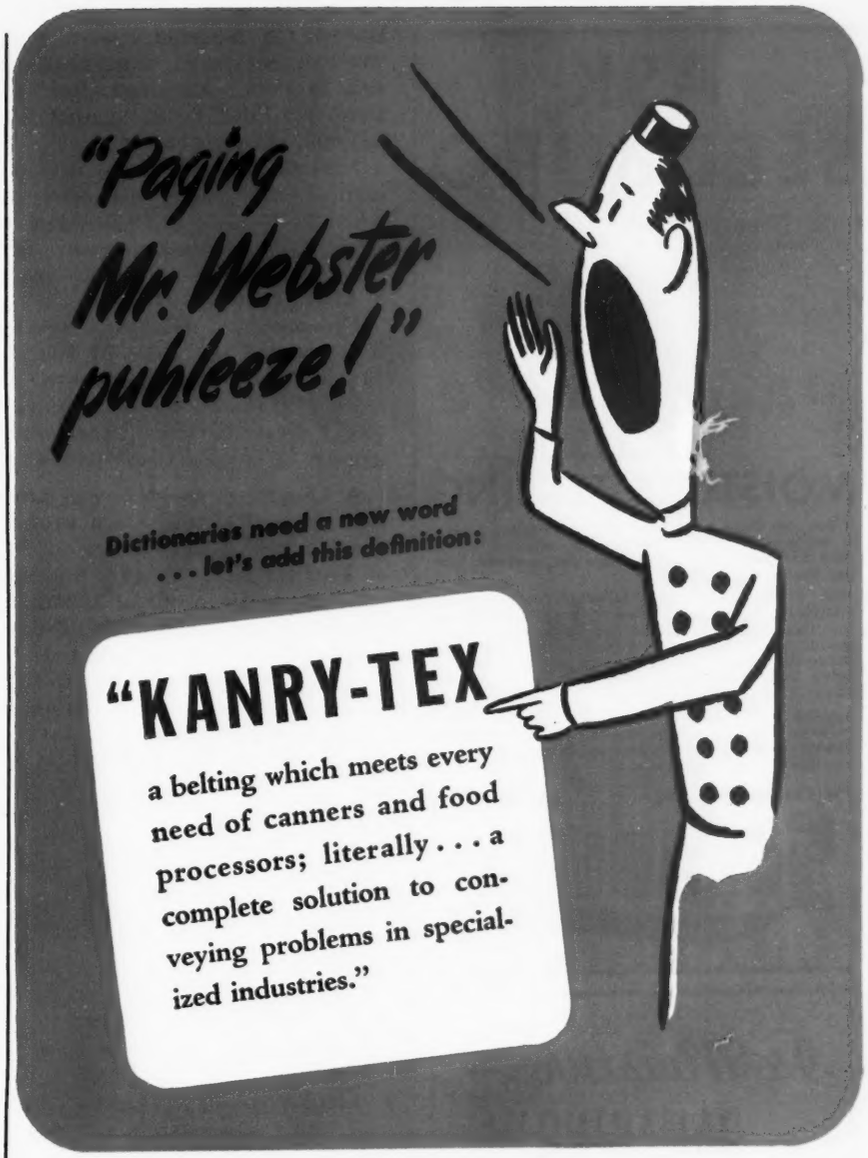
Statements Show Sales Up, Profits Down

HIGHER dollar sales and lower profits were the rule rather than the exception among food companies, during 1947. General Foods Corp., in its annual statement, reveals net sales of $407,266,000, compared with $317,790,000, in 1946. Net earnings, after provision for preferred stock dividend requirements, were $18,303,594, or $3.19 per share. The previous year's net earnings were $21,147,515, or $3.79 per share.

General Baking Co. showed total sales of $103,439,444, an increase of $24,450,000 over the previous year. Net profit, after provision for federal taxes, was $2,740,284, compared with $3,964,625, the year before.

Ward Baking Co.'s net sales were $80,547,804, in 1947, against 1946 sales of $70,528,129. Net income was $2,531,425 against $3,642,738.

Not quite following the trend, The


"Paging Mr. Webster publeeze!"
Dictionaries need a new word . . . let's add this definition:
"KANRY-TEX
a belting which meets every need of canners and food processors; literally . . . a complete solution to conveying problems in specialized industries."

● Heretofore, folks in food industries had to look in several places to find what is now all in one product . . . KANRY-TEX

Imparts no odor or taste . . . that's KANRY-TEX

Resists moisture, alkali, fats and oils . . . that's KANRY-TEX

Washable with live steam, hot water or sterilizing agents . . . that's KANRY-TEX

Long lasting and economical. . . that's KANRY-TEX

We'd like to tell you more about the advantages of KANRY-TEX

We're sure you'll be interested for many practical reasons. *Write today.*

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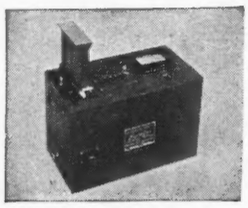

about

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Men of Seedburo have technical and practical knowledge of the most effective methods of finding the true moisture content of dehydrated foods, cocoa, grains, feeds, nuts and a host of other products. They have helped large numbers of firms solve their moisture testing problems . . . very likely they can help you.

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*Reg. U. S. Pat. Off.

Borden Co. reported sales of $602,959,406, compared with $542,998,805, in 1946. Earnings after taxes were $19,793,276, as against $19,581,006, the year before.

National Dairy Products Corp., earnings on a share basis were indicated to be $3.68 in 1947, compared with $4.05 the previous year. Total sales were $897,324,000, an increase of $154,915 over 1946.

Creameries of America, Los Angeles, reported net sales of $39,234,549 last year, compared with 1946 sales of $35,556,354. Earnings in 1947 were $749,330 after taxes, against $1,637,674 the previous year.

A whopping exception was American Sugar Refining Co.'s profit of $16,635,358, before taxes on sales of $302,160,948. In 1946 the company showed a profit of $6,932,980, before taxes, on sales of $169,886,027.

Hunt Foods, Inc. reported consolidated net sales of $46,276,702, and a net income, equivalent to $5.51 per common share, in 1947. The 1946 period, which was of only nine months duration due to a change in the fiscal year, showed net sales of $48,353,732, and a net income equivalent to $8.50 per common share.

A. E. Staley Mfg. Co. set a sales record of $146,353,726, in 1947, which compares with $99,862,966 for 1946. Net profits came to $9,491,266, equal to $10.99 per common share. Net profit in 1946 was $7,660,559 or $8.79 a share.

Among industry suppliers, American Can Co. reached a new high in sales of $338,163,242, compared with $258,065,461, in 1946. Net income, after all taxes but before contingency reserves, was $21,836,624, compared with the previous year's $8,828,983.

Continental Can Co.'s sales and operating revenues totalled $266,431,629, as compared with $212,924,315, the year before. Consolidated net income, last year was $12,809,543, compared with $6,162,944 in 1946.

Thatcher Glass Mfg. Co. reported net sales of $19,091,059, and profit from operations of $2,233,268. The 1946 net sales were $18,225,459 and profits, $2,774,787.

ACS Discusses Processes At Symposuim on Food

SYMPOSIUMS on food quality and control, food technology and fermentation were held at the April meeting of the Division of Agricultural and Food Chemistry of the American Chemical Society in Chicago. Several of the discussions hold particular interest for the food processor.

F. W. Fabian, Michigan State College, discussed quality control of pickles. In the manufacture of pickles, the control of quality varies with the type of pickle. The three general types of pickles are: Fresh cucumber pickles, fermented pickles and salt stock pickles. Fresh cucumber pickles are easily controlled chemically and bacteriologically. Cucumbers are picked, washed, canned in brine and pasteurized for 15 min. at 165 deg. F. Fermented pickles are more difficult. They are affected by weather, salting condtions and microbial associations. Salt stock pickles are made by withdrawing the salt, adding vinegar and spices and, perhaps, sugar. Very accurate control can be attained by use of proper formulas and manufacturing procedures.

The quality of apple juice depends upon the selection and proper blending of several varieties of mature and

ADA ELECTS OFFICERS

Here are the men elected at the ninth annual meeting to head the American Dairy Association for the coming year. From left: Bryce S. Landt, Wisconsin Dells, Wis., president; Chester R. Schoby, Bode, Iowa, vice-president; W. L. Hendrix, Boise, Idaho, secretary; W. J. Sawyer, Chicago, treasurer, and W. J. Murphy, Bismark, N. D., assistant secretary-treasurer.

ripened apples, stated Roy E. Marshall, of Michigan State College. Brix reading should not be less than 12.5 and malic acid content from 0.4 to 0.65. Flash pasteurization at maximum temperatures of 165 to 175 deg. F. and prompt cooling to less than 100 deg. F. are important to assure palatable juice.

Scoring for evaluating food by panel testing should include color, texture and judgment of quality during mastication in addition to taste and aroma, in the opinion of L. C. Cartwright and Robert Nanz of Foster D. Snell, Inc., New York. The factors of oiliness in fatty foods, sweetness in spiced foods and the well-known glutamate taste have been studied in the development of basic test foods. In a discussion of the psychology of flavor factors, the advantages of these test foods were noted and the formulas were given.

Fermentation of processed molasses yields yeast of a high purity but low vitamin content, according to Gustave Reich, of Philadelphia. Reactivation of this yeast by refermentation produces a yeast high in protein and vitamin content and of light color.

Prize Article Contest Closing Date Extended

Delayed publication of the April issue of FOOD INDUSTRIES—due to printing difficulties—necessitates an extension of the closing date which had been set originally for April 15. Manuscripts reaching us since that date are being accepted, and will continue to be accepted until June 1, in order to give potential authors time to take advantage of the extension.

For the best article on how a food plant recently applied modern methods to reduce operating costs, the author will be awarded $100, Second award will be $75, and third, $50. Articles winning no prize will be considered for publication at our usual rates.

Your article should tell in about 2,000 words what your problem was, what method you applied to get your costs down, and how successful you were. Good pictures suitable for reproduction and actual operating data on the process are highly desirable.

The editors of FOOD INDUSTRIES will judge the articles, which should be submitted not later than June 1, 1948. Winners will be notified as soon as possible after the contest closes.

Timeliness and general interest of the material will guide the editors in selecting the articles and in scheduling them for publication. The articles must be written exclusively for FOOD INDUSTRIES. Those ineligible for prizes or publication will be returned on request at the close of the contest.

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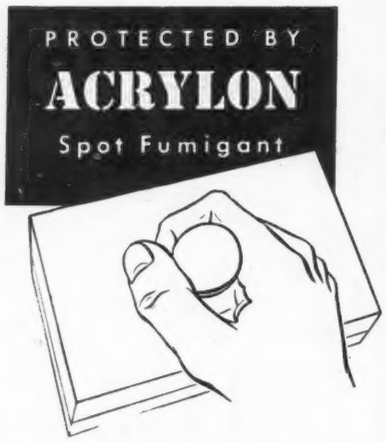

Depend on ACRYLON* Spot Fumigant to keep your food-processing and handling machinery free of insects. Just pour a few ounces into the machines, where infestations commonly occur, and rid them of insects overnight. Non-flammable, ACRYLON is fast-acting and highly toxic to all insects, yet so volatile that it leaves no residue to clog machinery or harm food products in any way.

ACRYLON is economical—just a few ounces in each danger spot will give complete kill of insect pests. Available in 15-gallon and 50-gallon drums.

For Thorough Building-Wide Insect and Rodent Control

specify AERO* LIQUID HCN Fumigant. Use it periodically with in-between applications of ACRYLON to strategic spots to assure constant pest control in food plants.

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KEEP YOUR PLANT INSECT-FREE AT ALL TIMES WITH LIQUID HCN AND ACRYLON

Millers Ask Changes In Bromated Standards

FLOUR standards were discussed for slightly over eight hours late in March on the proposal of the Millers' National Federation to amend the bromated flour and enriched bromated flour standards.

Evidence was offered by industry representatives to demonstrate that addition of potassium bromate to flour, for rapid aging purposes, should be permitted below the 15 percent protein content (dry basis) now set as the minimum in the standards. It was pointed out that protein content of wheat varies appreciably from year to year, and the standard just happened to be set in a year of very high protein wheat shipments. Evidence was introduced to the effect that there was no technologic reason for setting this 15 percent minimum.

Although bromate is used up to 50 parts per million for occasional export shipments of bromated flours, domestic practice usually is to use considerably less bromate. Optimum performance of the flour is determined for each representative lot of wheat, and bromate added accordingly.

It was demonstrated that most of the bromate added to the flour is consumed in oxidizing the reducing substances which are present in varying amounts in the wheat, or in the fermentation and baking of the doughs. No opposition was expressed by any witnesses. Two F & D A representatives from the pharmacology division testified that they foresaw no possible harm to humans resulting from the quantities of potassium bromate which might conceivably remain in the foods prepared from bromated flours.

By amending the flour standards as proposed, it would be possible for millers to age or mature flour without six to nine month storage, and without using nitrogen trichloride. It is this latter substance that was recently found to be harmful to a number of animals in nutrition tests when their diets include products from flour which had been aged by treating with nitrogen trichloride. Briefs on this docket must be filed by May 6. A tentative order will probably follow shortly thereafter.

Fishery Research Ship Commissioned

THE "Albatross III", converted trawler, was commissioned, on March 19, at the Boston Fish Pier, as the government's first floating marine laboratory. It will be used by the U. S. Fish and Wildlife Service in ocean research and will be based at Woods Hole, Mass. The ship is 180 ft. long, has an 800 h.p. Diesel main drive, and will be manned by a crew of 18. The ship will carry a staff of seven scientists. Immediate studies will be made on the North Atlantic fishing banks of the depletion of cod and haddock, and surveys

Wide World

STILL NOT ENOUGH MAPLE SAP

Early reports incidicate another short run of maple sap in all producing areas. Production may improve as the New England season, where this picture was made, wears on.

of new fishing grounds will be conducted. A large and distinguished gathering attended the exercises, including many fishmen. J. A. Krug, Secretary of the Interior, gave the principal address.

Secretary Krug said that fishing is today a billion dollar enterprise, and a major factor in the national wealth. "This ship is, I hope, but the first of many such research vessels to be put in service by our government to develop the science of fishery conservation."

The fishing industry has been concerned that the United States has slept while other nations operated whole fleets of research vessels and explored new fishing grounds. Russia, it is pointed out, has just announced a a 5-year plan for fisheries expansion in the Pacific. She expects to increase her catch in that area 2½ times by 1950. Her fishing research ships are of the most modern type. Before Pearl Harbor Japan had 95 such research vessels.

For domestic sale, at present, 13 percent of fish landings in Boston travel over 1,000 miles to Mid-West markets. Over 30,000 persons are employed in the New England fishing industry. Eight hundred of the larger vessels and several thousand smaller boats are at work in New England's $200,000,000 fishing industry. While the total harvest from New England waters has been increasing of late, a number of the more valuable and popular species show signs of serious decline. Cod and herring are now caught in tens of millions of pounds against former hundreds of millions. The haddock catch is but two-thirds of its 1930 peak.

Beginning in April the scientists aboard the Albatross III will resume their study of the fishing banks. They will conduct a "census" of the fish population and study the rise and fall of fish stocks under different levels of fishing intensity. They will try to learn the secret of changes in sizes and location of fish populations.

Sanitation Defined

A PROPOSED instruction to govern Federal inspection of certain food plants amounts to a code of sanitation. As published in the Federal Register March 23, the proposed rules cover comprehensively sampling, grading, grade labeling, and supervision of packaging of butter, cheese, and other dairy products. Included are arrangements for surveys of plant and premises and many building construction, and personnel help and supervision requirements.

Speed is vital in these businesses

Hotels are big Air Express users—obtain equipment, supplies and fancy foods the fastest way. *Speed pays.*

Idle equipment makes profits vanish. Industry gets replacement parts by Air Express—keeps things rolling! *Speed pays.*

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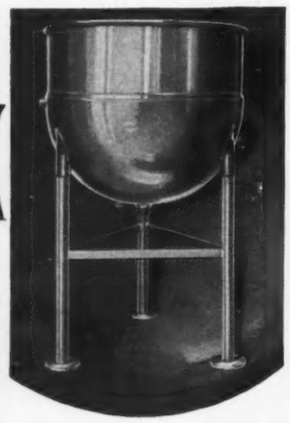

SANITARY SLEEVE VALVE

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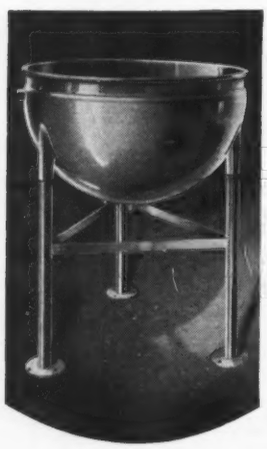
AN IMPROVED METHOD

of processing which keeps outlet tube free of all material thus eliminating repouring and assuring perfectly mixed batches of contents. A great saving in labor cost is effected and the continual watching of kettle is unnecessary.



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Made of cold drawn stainless steel, highly polished, this valve is in accord with Hubbert quality and is designed for long wear and accurate operation. Valve openings lies close to the bottom of inner shell. Will shear off heavy and semi solids and large particles.

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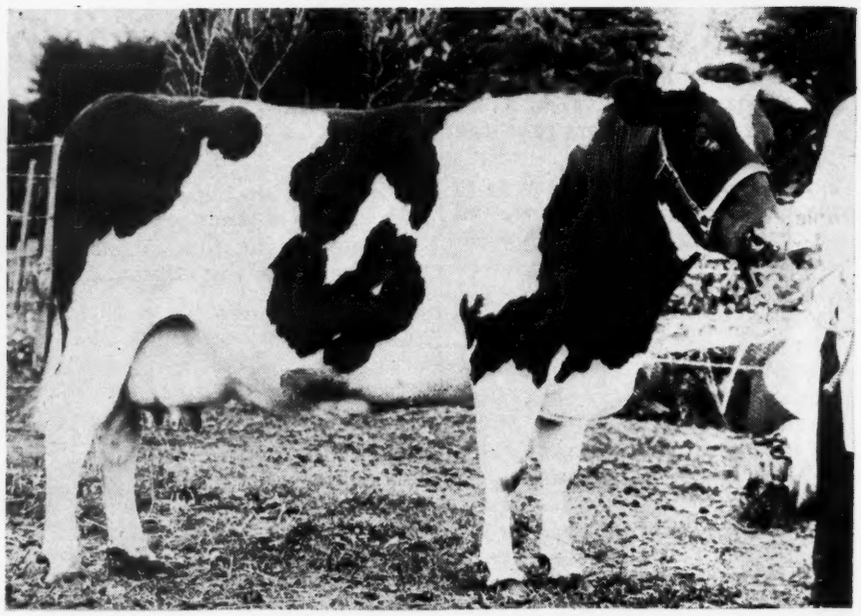


British Combine

"STOUT" COW BREAKS RECORD

With a half-gallon of British stout included in her daily menu, Bridge Birch broke the world's record for one year's milk yield. She gave 44,289 lb. in 350 days. The previous record, held by Carnation Ormsby Faynem was 41,943 lb. in 365 days.

Monosodium Glutamate Given Thorough Study

MONOSODIUM glutamate, used as a flavor intensifier in a wide variety of foods, was the subject of thorough review in a symposium held March 4 at Hotel Stevens, Chicago. Over 100 food technologists, production executives and research chemists attended the meeting sponsored jointly by the Quartermaster Food and Container Institute for the Armed Forces and Associates Food and Container Institute, Chicago. Dr. W. Franklin Dove, head of the Food Acceptance Branch, QMC Food and Container Institute, served as chairman.

Eleven speakers, representing a nationwide cross-section of experts in the fields of food processing and packaging, nutrition and pharmacology, reported on their recent findings in glutamate research and production technics.

Taste and flavor properties of glutamate were described in papers by S. E. Cairncross and E. C. Crocker, Arthur D. Little Co., Cambridge, Mass., and by Stephen L. Galvin, Huron Milling Co., New York, N. Y. Lloyd A. Hall, Griffith Laboratories, Inc., Chicago, Ill., reported on mixed protein hydrolysies and Paul D. V. Manning, vice-president in charge of research International Minerals and Chemical Corp., Chicago, Ill., described quality production of glutamates.

Crocker reported that glutamate has the property to stimulate sensory nerves of the mouth and throat, producing a taste satisfaction, and that it improves the flavor of many foods although it has no detectable aroma. Cairncross discussed its use by food processors and chefs as a flavor adjunct, to improve the flavor in such foods as meat, stews, soups, gravies and chowders. He also cited its successful use in fresh vegetables and its reduction of flavor impairment in overcooked vegetables.

Experiments on its use in sea foods, by Carl Fellows, University of Massachusetts, Amherst, Mass., disclosed that glutamate adds flavor to fish cakes, fish chowders and other canned and processed sea foods.

When used in food specialties, its relative high cost limits its use to higher priced items, according to John H. Nair, Continental Foods, Inc., Hoboken, N. J. Cost of specialty ingredients, balanced formulas, trained taste panels and long range storage and consumer tests are determining factors governing its use in the food specialty field.

The flavor-enhancing properties of glutamate were discovered in 1908 by Dr. K. Ikeda, Tokyo University, in his experiments with an edible Japanese sea weed, according to a paper by Albert E. Marshall, pres-

ident of Rumford Chemical Works, Rumford, R. I., and read by J. R. T. Bishop, vice-president, Amino Products Division, International Minerals and Chemical Corp., Chicago. After its discovery, glutamate was manufactured in Japan by acid hydrolysis, using wheat gluten as the raw material and, later, soya protein. Brought to the U. S. in the mid-1920's, attempts to manufacture it from sugar beet residue by acid hydrolysis were unsuccessful. After 10 years of research and pilot plant experiments, an alkaline process was evolved and a high purity, non-racemized glutamate was manufactured for commercial use.

Additional papers presented were: "The Relation of Glutamate to the Browning Reaction," by M. L. Anson, Continental Foods, Inc.; "Thresholds of Perception of Glutamate," by Dr. Rosaltha Sanders, Food Acceptance Branch, QMC Food and Container Institute, Chicago, Ill., and "The Pharmacology of Glutamic Acid," by Dr. Carl Pfeiffer, Department of Pharmacology, University of Illinois, Chicago.

Some Grade Standards Changed by F&DA

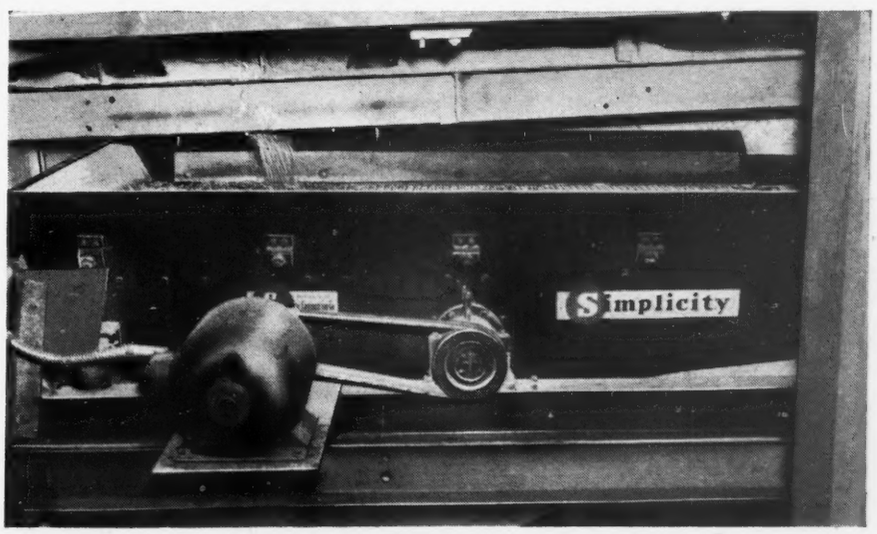
FRUIT PRESERVES (or jams) have been covered by U. S. grade standards issued by the Department of Agriculture five years ago. A proposed revision of these standards was published on page 1408 of the March 18 Federal Register, with written comments invited by the 17th of April. Three changes were proposed: (1) Tables have been incorporated which show specific defects allowed in different kinds of preserves. (2) Correlation of allowances for defects in the preserves has been attempted in the cases where the preserves have been made from frozen fruits, for which certain defect allowances were made under the frozen grade standards. (3) Mold count requirement in the grade standards has been removed in the proposed revision. A sample score sheet is included in reprinting of the entire standards.

EGG STANDARDS and grades as issued September 5, 1946, have been printed in the Federal Register (beginning on page 1359 of the March 16 issue) to comply with the Administrative Procedures Act. No revision in the standards has been made since they were issued 20 months ago.

MEAT GRADING regulations have also been printed in the Federal Register recently (beginning on page 1275 of the March 10 issue). Although officially labeled "amended", there are only slight changes in some of the

SIMPLICITY UNIT SCREENS 2600 bushels of soy beans per hour

What's your food processing problem? If it concerns sizing and separating, Simplicity Gyrating Screens will solve it . . . quickly and profitably. Consider the top-notch job a Simplicity 3' x 6' Single Deck Screen is doing for an Ohio Farm Bureau Co-Operative Association in screening stones from soy beans. Previous to the installation of the Simplicity screen, a set of hard roll shells and press screws gave only about five months' service. Now, however, the soft shell rolls and press screws being used show little sign of wear and will have an estimated life-span of 24 months. Equipped with 3/8" square opening screen cloth this unit is operating 24 hours a day and screens 2,400 to 2,600 bushels of beans every hour and can easily handle more if production demands. We'll be glad to review your food processing problems and suggest Simplicity equipment that will increase production and save you money. Just send us the information.



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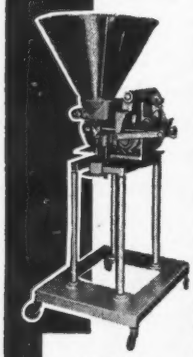
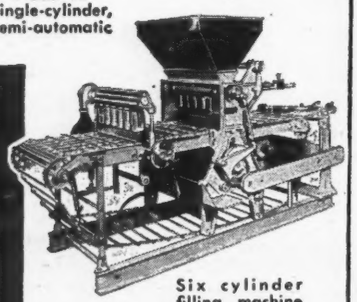
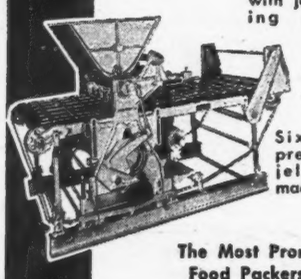


Model B. Single-cylinder, semi-automatic



Six cylinder filling machine with jar cleaning device.



Six cylinder preserve and jelly filling machine.

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JAMS	LACQUER
SYRUP	MAYONNAISE
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GLUE	VANISHING CREAM
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GREASE	SIMILAR PRODUCTS

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definitions. These refer to the prepared meats and are intended to bring the grading regulations into line with those of the Meat Inspection Division of the Bureau of Animal Industry.

Meat grades, as designated by Federal inspectors, continue to be known only by name, such as "choice", "good", "commercial", and "utility". Meat grades which are advertised as Grade "A" or "AA" or by other letters are in no case Federally authorized grade designations. This distinction was pointed out in an official release of the Department of Agriculture. Not stated in that release is the fact that both words and letters are used by Federal inspectors when grading processed fruits and vegetables, one of the other active programs in the same Production and Marketing Administration which is responsible for meat grading.

Cauliflower grade standards, which have been in effect since 1939, are being amended in two minor respects. Provision is made in the proposed new standards for different trims which are now on the market, a new definition is proposed for the defect "riceyness." The standards, as amended, were printed on page 1567 of the March 24 Federal Register. Formal promulgation of the revised standards follows the April 13 deadline, by which date written comments were to be received by PMA.

Several foods were considered actively by Food and Drug Administration in the food standards program during recent weeks.

Bromated flour and enriched bromated flour have been covered by food standards for several years. A hearing was held on March 24 and 25 to consider a proposal by the Millers' National Federation to amend the existing standards slightly.

Canned green beans and canned wax beans were the subjects of a hearing the preceding week, to amend the standards of quality in certain particulars. Tentative and final orders by the Administrator may follow more rapidly than usual, in view of the request for early action, and in view of the lack of opposition to the proposed amendments.

Cheese will be covered by standards of identity following issuance of expected tentative and final orders.

Salad dressings are also awaiting tentative and final orders. However, briefs may still be filed until May 17 on this docket.

Canned oysters are now covered by formal standards of identity and fill of container. The final order was published in the March 13 Federal Register beginning on page 1337. This order was issued despite a request for further hearing on the subject by representatives of the Pacific oyster canners. June 11 was announced as the effective date for these standards.

Canned shrimp standards of fill of container were expected to be covered by a final order, perhaps before this issue is read.

Frozen fruits were to be discussed at a hearing beginning on April 19. Standards of identity and fill of container are proposed for apricots, blackberries, blueberries, boysenberries, cherries, currants, gooseberries, grapes, huckleberries, loganberries, nectarines, peaches, plums, raspberries, rhubarb, strawberries, and youngberries. Optional sweetening ingredients include sugar, or any mixture of sugar with dextrose or corn sirup solids or both (containing not less than 66 ⅔ percent by weight of sugar). Optional liquid packing media may be heavy, medium, or light sirup, or corn sirup. They may be made with one or any combination of sugar, invert sugar sirup, dextrose, corn sirup solids, corn sirup, and glucose sirup.

The term "glucose sirup" is defined as "a clarified and concentrated aqueous solution of the products obtained by the incomplete hydrolysis of a starch other than cornstarch; the solids of glucose sirup contain not less than 40 percent by weight of reducing sugars calculated as anhydrous dextrose." Other optional ingredients may be ascorbic acid, citric acid, "other designated ingredients as the evidence adduced at the hearing warrants", or any mixture of two or more of the above ingredients. The proposed standards of fill of container cover fruits specified above, and in addition may include mixed fruits. Maximum percent by weight of liquid packing medium in the finished frozen fruits is specified in the proposed standards as zero percent for unstemmed currants and unstemmed grapes. Permissible packing medium ranges from 25 to 37 percent for all other fruits.

Foods on which hearings may be anticipated at some future date include canned corn, bread, and ice cream. F & D A will probably take the initiative in calling for a hearing on canned corn, but industry representatives are still studying the 1947 pack to determine whether, in their opinion, sufficient data are yet available on which standards could be based. Hearings on bread and ice cream were held before the war, but will probably reopen before

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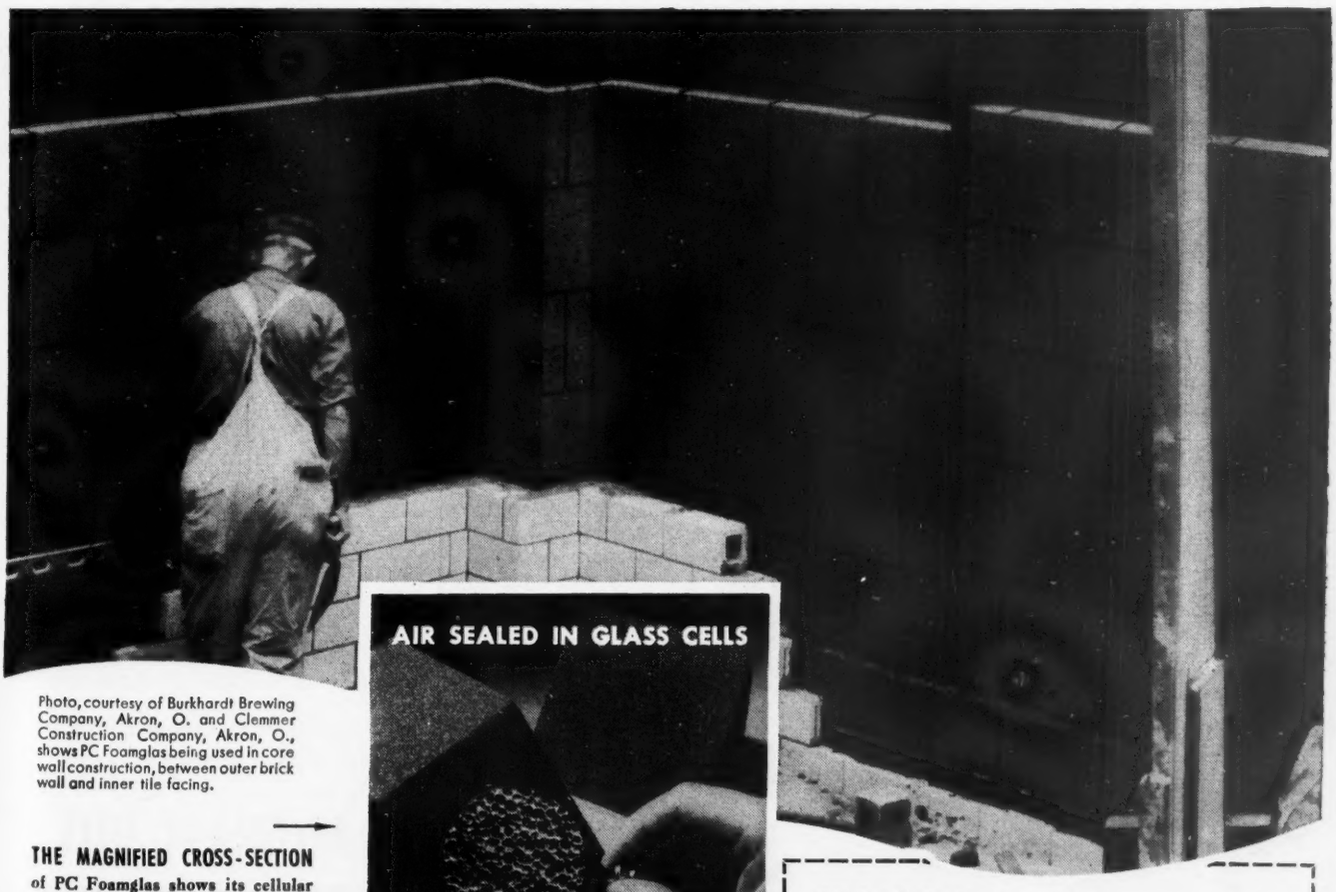
When you insulate with FOAMGLAS . . . you insulate for good!



Photo, courtesy of Burkhardt Brewing Company, Akron, O. and Clemmer Construction Company, Akron, O., shows PC Foamglas being used in core wall construction, between outer brick wall and inner tile facing.

THE MAGNIFIED CROSS-SECTION of PC Foamglas shows its cellular structure . . . glass bubbles solidified into big, strong, rigid blocks. In the millions of cells of glass-enclosed air, lies the secret of its insulating value.

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Separation Headquarters Since 1899

further official action is taken by F & D A.

Chocolate standards do not now permit addition of vitamins for the purpose of making an enriched candy bar or other confection. Request for a hearing to amend the present standards was denied by the Federal Security Administrator early last year. The Cook Chocolate Company petitioned the District Court of the United States for the District of Columbia, asking for a ruling that they be given a hearing. Court trial is expected late in 1948.

New Dry Flavorings Marketed by Britons

FLAVORS in a new dry form for processed foods and ready mixes, are now being demonstrated in the U. S. by M. W. Ferris and F. Wilkinson of the A. Boake, Roberts & Co., Ltd., London. These flavors were prepared first in 1935 and met with considerable success in Great Britain, the Dominions, and many countries of Europe. Interruption of the war prevented their introduction of the U. S. until this time.

Differing from most powdered flavors that resemble liquid essences dispersed through or absorbed on a vehicle, the new flavors represent a successful attempt to prevent evaporation or deterioration by "sealing in" the flavor of each particle in a manner resembling a nucleus surrounded by its own protective envelope. The flavor will remain dormant until the protective coat is washed away by the addition of either water or milk.

A few grains of powder placed upon the hand are practically odorless, but the addition of a drop of water releases the characteristic flavor. With this type of flavoring material, the shelf life of ready mixes, so far as flavor is concerned, can be extended greatly. Better distribution of flavor into the mix can also be facilitated since the material is dry without the tendency to lump or clog.

The material is now being produced in quantities to handle all demands. The Greene Trading Co., Inc., 70 Pine Street, New York City is representing the A. Boake, Roberts & Co.

Dry Beans

THE Department of Agriculture has revised allocation for export during the 1948 fiscal year of 2,299,500 bags (100 pounds) of dry beans and 2,007,100 bags of dry peas. These allocations supersede but are not in addition to previously announced allocations totaling 1,427,000 bags of beans and 1,961,300 bags of peas.

HERE'S A

Parade

YOU WON'T WANT TO MISS...

Everybody loves a parade but here's one that's particularly interesting to YOU because it's packed with "pocket-book" appeal. It's a never-ending parade of products and services designed to help you do *your* job better, quicker and cheaper. You're in the "reviewing stand" for this parade because it comes to you in the advertising pages of every issue of this magazine. Alert manufacturers use these advertising pages to get the *news* about their products and services to *you*... quickly and effectively. To be well-informed about the latest developments in *your* industry... and to stay well-informed... *read all the ads too.*

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She's never out of the money!

In this race for the all-mighty consumer dollar, consider the favorable odds offered your advertising by Woman's Day. Here's a purse of $11,637,000,000 . . . the 1948 spendable income of our stable of more than 3,000,000 housewives and mothers . . . almost twelve billions destined to be won by advertisers who place their copy in the book that caters to the needs of the 11,400,000 members of our collective family.

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$ 188,000,000 for Personal Care
$1,459,000,000 for Household Operations
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To win a place in this show, bet your advertising dollars on the lowest page rate per thousand of any women's service magazine; on the greatest single copy sale of any magazine in existence; on the greatest percentage of housewives and mothers of any women's service magazine; on an editorial technique so vital that it has pulled (without advertising inducement) more than 600,000 reader letters and more than 700,000 requests for instructions in a single year.

FOUND MONEY—a recent editorial offer for a twenty-cent item produced 320,506 reader requests and nearly two tons of dimes from the 3,000,000 readers of Woman's Day.

Advertisers who count costs court women who count pennies

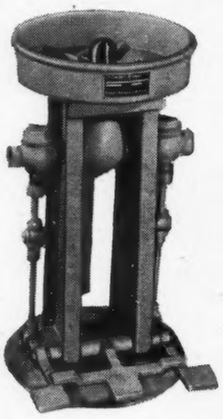
because buying is a woman's business

a Woman's Day is never done *selling!*

THE A&P MAGAZINE

use this easy way to sterilize milk cans

the Bestov milk can rinser and sterilizer



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Cans become clean, gleaming and odorless Here's a faster, more efficient, and lower cost means of rinsing and sterilizing standard milk, cream and ice cream cans. Stubborn milk or cream residue comes off cans with this modern, low-cost machine. In stock for prompt delivery. Don't delay . . . eliminate back-breaking reaches . . . write today for full details or see your Cherry-Burrell representative.

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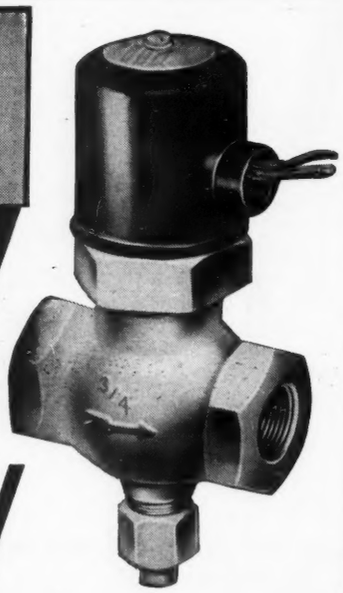
New SINGLE SEATED VALVES



- Unsurpassed refrigeration valves, specifically designed for the control of Freon, Sulphur-dioxide, Methyl-chloride—suction lines or hi-pressure liquid lines. Also air, water, gas, light oil, etc.
- These direct operated, single seated needle valves are held open electrically, thus eliminating unnecessary compressor burdens. Positive shut-off for fractional tonnage installations.
- Features: Die-forged bodies • Hardened steel needles • Corrosion-proof internal parts • Gasketless construction Integral mounting features • Moisture-proof construction • High pressures Single or dual voltage coils.

by K-15

GENERAL CONTROLS
801 ALLEN AVENUE GLENDALE 1, CALIF.
Manufacturers of Automatic Pressure, Temperature & Flow Controls
FACTORY BRANCHES: PHILADELPHIA • ATLANTA • BOSTON • CHICAGO • DALLAS KANSAS CITY • NEW YORK • DENVER • DETROIT • CLEVELAND • PITTSBURGH HOUSTON • SEATTLE • SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

DISTRIBUTION

Du Pont Fires Guns In Cellophane Suit

IN a broad statement on the Department of Justice anti-trust suit involving the manufacture of cellophane, E. I. duPont de Nemours & Co. indicates a fight to the bitter end. Referring to the suit in the company's annual report, the statement reviews the history of cellophane production and the "abuses" of lowered pricing and expanded production.

"It always has been the belief of the company's management," the statement continues, "that, in instituting and developing the manufacture and sale of new and useful products of industry and in encouraging their use by rendering them available to the public at ever-lower costs, it has been pursuing a course not only in the interest of its stockholders, but has also been serving the public interest. . . .

"The initial producer of a product is, of necessity, for a period at least, the sole producer of that product. If that new producer pursues an aggressive policy of development and research and manufacture, and is thereby able to make his product available to the public at ever-lower prices, it is quite probable that for a period of years he will continue as the producer of more than a majority of the product, as was the case in cellophane. If the Department of Justice is able to sustain the theory that such a practice is in violation of the public's interest, it may well be that the du Pont company, as well as other companies, may have to reconsider the time-honored policy of making new and better products available to the public at lower prices."

Seek Injunction

THE tin can situation was stirred up again this month as the result of a legal action by Continental Can Co., seeking an injunction against the Department of Commerce, which would stop the department from enforcing part of its tin conservation orders.

The can company sought an end to Direction 10, the amendment to the tin order M-81 which:

(1) Forbids the use of tinplate ends on animal food cans;

(2) Forbids the use of tinplate for coffee cans;

(3) Forbids the use of one-quart refinery-sealed tinplate cans for motor lubricating oil; and

(4) Limits the weight of tinplate

ANSWERING OFTEN-ASKED QUESTIONS ABOUT VisQueen*

POLYMERIZED ETHYLENE FILM

and its application to modern packaging

Is VISQUEEN Film flexible at very low temperatures?

Tests show VISQUEEN Film retains flexibility at temperatures as low as 94° F. below zero. This fact makes it ideal for frozen food packaging.

How about strength?

Tear resistance of VISQUEEN Film is definitely superior. In tests, strips of VISQUEEN Film .075" in thickness have been folded double without breaking at minus 112° F.

Is VISQUEEN Film waterproof?

VISQUEEN Film absorbs less than 1/1000 of its weight of water after long immersion. Was used by Armed Services to protect guns and other vital equipment against salt air and water in all parts of the world.

What is VISQUEEN Film's moisture vapor transmission rate?

Extremely low. Moisture Transmission remains extremely low, even when VISQUEEN Film is in actual contact with water on one side.

Is it non-adhesive?

VISQUEEN Film has very dry surface—has no tendency to stick, cling or "block". Items wrapped in VISQUEEN Film may be stacked or packed together without danger of sticking.

Do chemicals affect VISQUEEN Film?

VISQUEEN Film is chemically inert, contains no plasticizer. No active solvent has been found for this film, at room temperature. Unaffected by acids.

Is VISQUEEN Film sealable with heat?

Yes. VISQUEEN Film is a thermoplastic and may be heat-sealed on ordinary bar and roller type commercial sealing equipment with minor adjustment. Details on request. May also be weld-sealed by open flame method.

FIND OUT WHAT VisQueen* FILM CAN DO FOR YOU!

VISQUEEN Film is most economical, non-toxic, tasteless, odorless—has what it takes to solve a wide variety of packaging problems. Comes in variety of thicknesses, from very thin to very thick. Low specific gravity. Non-susceptible to humidity changes. Available in rolls of clear seamless tubing or sheeting in specified widths. For samples and complete information —write today to—The Visking Corporation, Preston Division, P. O. Box 1410A, Terre Haute, Indiana.

PURE
TASTELESS
ODORLESS

VisQueen* FILM

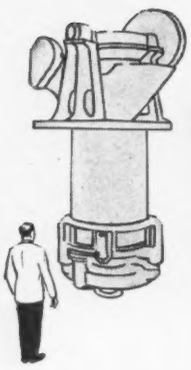
*T. M. The Visking Corporation

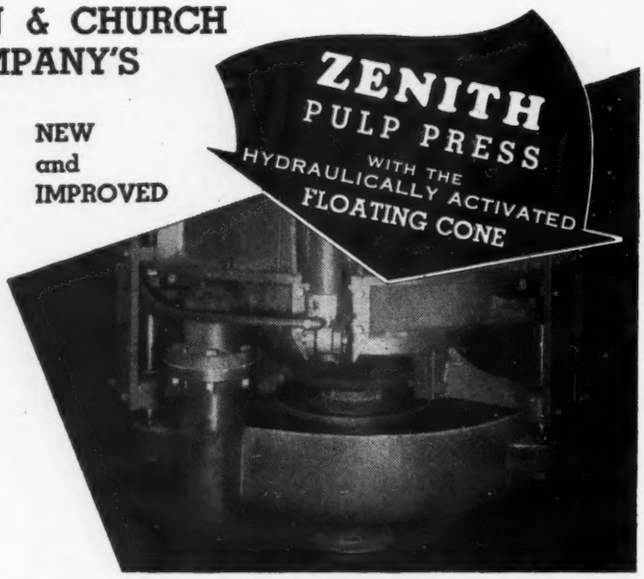
A product of The Visking Corporation, Preston Division, Terre Haute, Indiana

JACKSON & CHURCH COMPANY'S

NEW and IMPROVED

ZENITH PULP PRESS WITH THE HYDRAULICALLY ACTIVATED FLOATING CONE





JACKSON & CHURCH COMPANY'S ZENITH PRESS offers GREATER efficiency . . . GREATER profits . . . with the hydraulically-operated cake discharge port or "floating cone."

Long the finest dewaterer on the market, Zenith's new 100% automatic continuous operation assures CONSTANT, UNIFORM discharge pressures at any predetermined degree by finger-tip control. Cake Uniformity assured.

With new Zenith you'll notice decreased maintenance costs and minimum power consumption as compared to fixed-opening equipment.

These J & C engineering triumphs . . . found only in Zenith Press . . . are available to paper pulp manufacturers, canneries, corn starch plants, fish reduction plants, meat packers, glue plants, and citrus and waste drying plants.

For engineering or additional data write Jackson & Church Company at Saginaw, Michigan.

A PRODUCT OF

JACKSON & CHURCH COMPANY, SAGINAW, MICHIGAN

WORK WELL DONE SINCE '81

New! **TERRISS 3-SPEED**

PORTABLE MIXER

STIRS • BLENDS
MIXES • AGITATES

No more carrying heavy mixer . . . clamping to tanks . . . breaking side walls.

The New TERRISS 3-Speed Portable Mixer is an all-around unit that will take care of all your mixing, blending and agitating problems. If your tank or vat is below floor level the TERRISS 3-Speed Mixer will reach down and do a real job for you. If your container sits on the floor, a little adjustment and the mixing begins. If your tank or container is high off the floor, the TERRISS Mixer will lift up and do the mixing job.

All parts that touch your product are Stainless Steel. Standard belt drive permits propeller speeds of 175 RPM, 325 RPM and 575 RPM. Other combinations are available with simple adjustments. Both propeller shaft and stand are adjustable, permitting unlimited settings to fit any job in your plant.

Send your order today . . . money-back guarantee.

CONSOLIDATED
SIPHON SUPPLY CO., INC.

Dept. F, 22-24 Wooster St. **New York 13, N. Y.**

Wide World

HAWAIIAN TUNA

In the three years since the war's end, Hawaii's sampans, manned largely by Nisei, are bringing in record tuna type catches. With the Pacific closed to the Japs, the Hawaiians are building a lush fishing industry, which they hope will span the Pacific.

that can be used in cans for pigmented oil paints.

Direction 10 was made effective at the beginning of March, when Congress extended the wartime powers of the administration to restrict the use of tin.

Continental Can Co., in filing the legal action, re-stated the position it took during the hearings on the continuation of the government's tin controls:

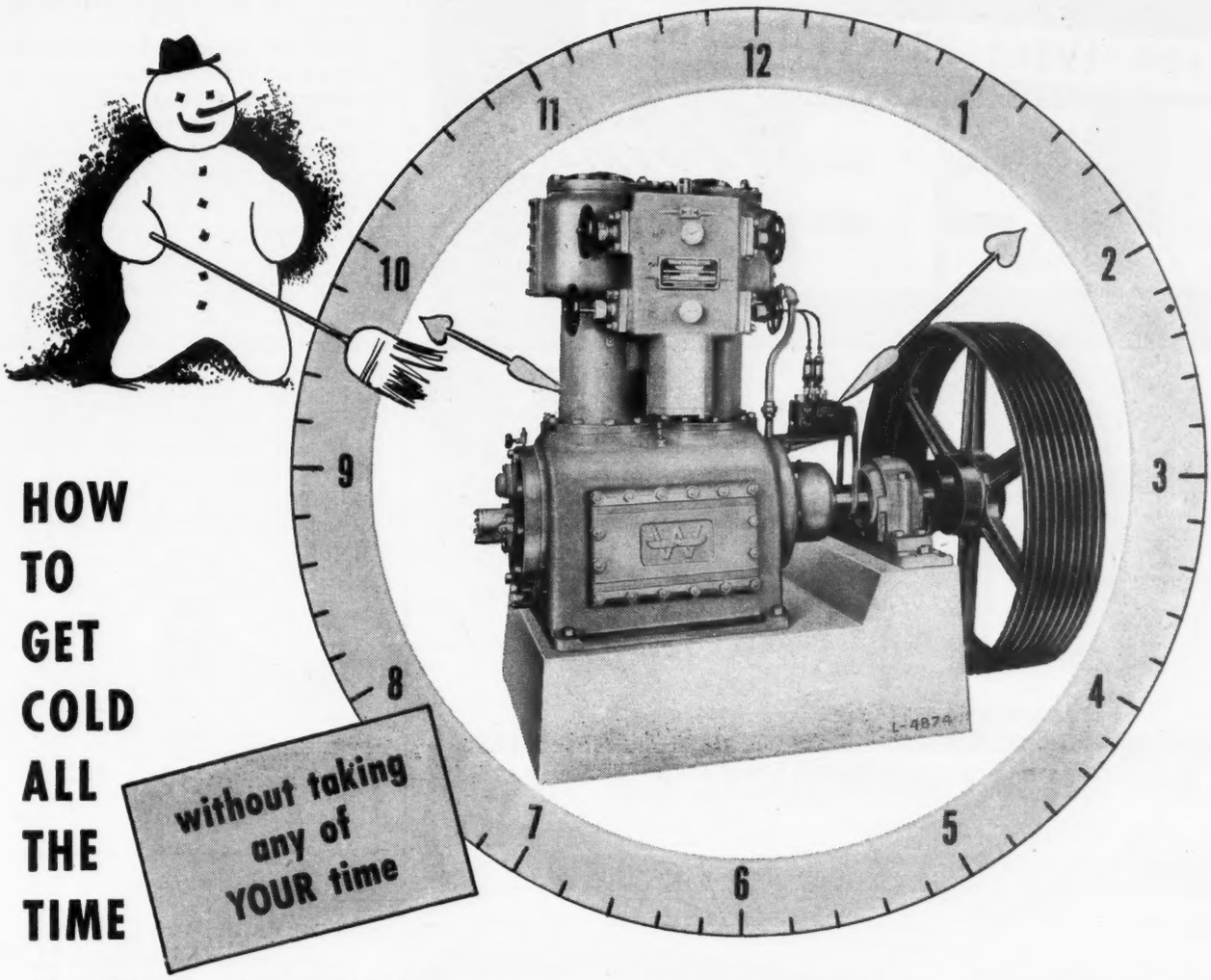
(1) It was not against tin conservation as such; and it did not quarrel with the government's policy of restrictions total tin usage by can manufacturers, but

(2) The restrictions of Direction 10 discriminate against can producers, while leaving other tin using industries—which use 70 percent of U. S. tin supplies—unhampered by quotas or quantity restrictions.

In a statement filed at the time the court action was filed, Hans A. Eggerss, President of Continental Can Co., said, "If the specific production restrictions of this order are sustained, it is estimated that less than 1,000 tons of tin, out of an estimated total consumption of 88,000 tons and an estimated supply of 105,000 tons, would be saved in 1948."

Union Promotes

As part of a program to help protect the jobs of its members, Local No. 471 of the AFL Teamsters Union is sharing half the cost of a $22,000 promotion campaign to increase the consumption of home-delivered milk and other dairy products in Minne-



HOW TO GET COLD ALL THE TIME

without taking any of YOUR time

Worthington Ammonia Compressor with Multi-V-Drive

From original selection of the right size all the way to periodic inspection, you'll find that your Worthington Refrigeration Compressor makes less work for you.

Sizes of Worthington Vertical Two-Cylinder Single-Acting Compressors range from 3″ x 3″ to 10″ x 10″. Whatever your requirement, there's a Worthington Compressor virtually built *for* the job.

Once running, there's nothing to worry about, adjustments are rarely needed, maintenance is negligible. Why?

Because of such features as self-aligning double-row roller main bearing . . . pressure-lubricated cylinders, bearings and pins . . . large area Worthington Feather* Valves—lightest, tightest, quietest ever made — on suction and discharge . . . safety head to reduce slop-over hazard . . . unit-type manifold with improved quick- opening relief valve . . . Worthington Multi-V-Drive with easy-on, easy-off, always-tight QD sheave.

BALANCED SYSTEMS for all refrigeration

All around the refrigeration cycle, install Worthington equipment. Worthington *builds* more of the vital components than anyone else, so you can be surer of a *balanced* system—giving you the smoothest operation and lowest costs.

For further proof that *there's more worth in Worthington,* see your nearby Worthington Distributor, or write for bulletin to *Worthington Pump and Machinery Corporation, Harrison, N. J. Specialists in air conditioning and refrigeration machinery for more than 50 years.* *Reg. U. S. Pat. Off.

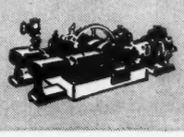
WORTHINGTON

A8-36

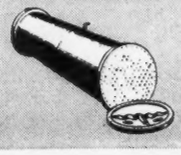
*Reg. U. S. Pat. Off.

FIVE MORE REASONS WHY WORTHINGTON LEADS IN INDUSTRIAL REFRIGERATION

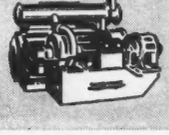
Horizontal compressors for all types of refrigerants



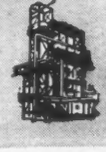
Shell and tube refrigerating equipment



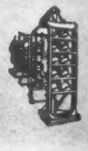
Centrifugal compressors



Absorption refrigerating machines



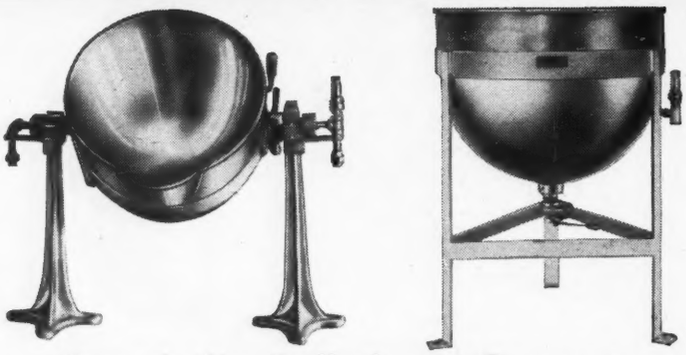
Chilling machines and exchangers



FOR EVERY PROCESSING NEED

LEE Kettles

WHERE CORROSION-RESISTANT EQUIPMENT IS NEEDED



Descriptive Bulletins on Request

LEE METAL PRODUCTS CO. INC.

416 PINE STREET . . . PHILIPSBURG, PA.

ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

Have you tried Monarch H-466 *Carbaloy Cemented Carbide nozzles?*

Drying work, and for extra long life, the parts subject to wear or erosion are made of Carboloy Cemented Carbide. Other parts are made of 18-8 stainless steel to resist corrosion.

Plants powdering milk, eggs, coffee, molasses, etc., report nozzle life of 50 to 100 times that of nozzles of ordinary materials. Think of the savings resulting from the elimination of "down" time alone!

MONARCH MFG. WORKS, INC.

2517 E. Ontario St. Philadelphia 34, Pa.

apolis. The industry is sharing the other half.

Both the union and the industry realize that more dairy products will be consumed if they are delivered than if people have to carry them from the grocery store, the union states in its monthly journal, the "International teamster."

Packaging Course

PAUL O. BOGT, General Electric Co., Schenectady, N.Y., and president of the Industrial Packaging Engineers Association, has revealed that the University of Illinois will conduct a Packaging and Materials Handling "Short Course" as a part of the association's third annual industrial packaging and materials handling exposition.

British Permit Token Shipments from U. S.

LONDON—The British government has announced that token imports from the United States will be continued during 1948. This means that, despite the acute shortage of dollars, British importers are authorized to spend dollars for a long list of specified articles—up to 20 percent of the value of 1938 imports of these same items. Owing to price rises of the past ten years, this figure represents about 10 percent of the volume of 1938 shipments to Britain. The quota certificates are automatically relayed to the British Board of Trade by the Department of Commerce and the U. S. Embassy in London. The American exporters, on the other hand, send the token shipment voucher direct to their British importers for use in getting import licenses through the Board of Trade.

Food products covered under the Token Import Scheme for 1948 include:

Rolled or flaked oats, cheese rennet, vegetable butter coloring, whisky, glace cherries, bottled fruits (processed for serving with ice cream), canned lobster, pickles, mustard, olives preserved in salt or brine, canned vegetables (other than tomatoes and tomato puree), quick frozen peas, canned soups, canned macaroni and spaghetti, canned pork and beans, jelly

LET MR. CELLOPHANE GUIDE YOU TO BETTER PACKAGING

THE QUALITIES you need for successful packaging are engineered into Sylvania Cellophane. Every step in its manufacture is carefully checked to assure you of maximum dust, grease and moistureproofness. This careful control assures Sylvania Cellophane's uniform transparency and strength . . . low temperature durability . . . heat sealing qualities . . . excellent printing surface.

Here's a package designed to show off coffee cakes to best advantage. The easy-to-apply overwrap gives maximum protection...enhances unusual carton design.

SYLVANIA CELLOPHANE

SYLVANIA DIVISION AMERICAN VISCOSE CORPORATION

Manufacturers of cellophane and other cellulose products since 1929

General Sales Office: 350 Fifth Avenue, New York 1, N.Y. *Plant:* Fredericksburg, Va.

USED BY LEADERS IN THE INDUSTRY

Complies Fully With All The Provisions of The Pure Food Act

KORONET HAIR GUARDS FOR WOMEN AT WORK

Koronet Hair Guards allow for natural sanitary air circulation. Smart, neat and decorative—comfortable, light and snug fitting—adjustable to any head size and all hair styles. Maximum protection against loosened hair falling or getting caught. Strong, durable, neatly webbed net and non-inflammable glossy plastic shield —wipes clean with damp cloth.

Some Newest Users

- Kellogg Co.
- Beatrice Food Co.
- Swift Co.
- Best Foods
- General Mills, Inc.
- Monarch Finer Foods
- H. J. Heinz Co.
- Hi-Hat Food Products
- Rutherford Co.
- Ed Martin Sea Food Co.
- San Xavier Fish Pack. Co.

Added Advertising Value

Any trademark, name or slogan can be imprinted on the shield in color.

FREE SAMPLE

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LA PORTE

FLEXIBLE STEEL CONVEYOR BELTING

Whether used in freezing, canning or dehydrating . . . on sorting tables, in scalders, washers or cookers . . . for bulk or packaged goods . . . La Porte Flexible Steel Conveyor Belting gives efficient, worry-free service. Its non-corrosive metal is not effected by steam, water or extreme temperatures. Its strong, flexible construction will not stretch out of shape . . . slip . . . weave . . . or jump. It is easily and quickly cleaned and sterilized with steam or hot water, and no special dressings or belt lacers are needed to keep it in peak condition.

Ask your Supplier Today. Available in any length and practically any width.

LA PORTE MAT & MFG. CO.
BOX 124 LA PORTE, INDIANA

powder, sugar confectionery of all kinds, (not including cocoa preparations), marshmallow (cooking ingredient), quick frozen fruits, cigarettes, manufactured and smoking tobacco, onion and garlic salt, and pectin (domestic pack)

Swiss Get Food in Exchange With Danes

ZURICH—The Swiss and the Danes have signed a trade treaty for the calendar year 1948 whereby Switzerland will send Denmark 64,000,000 crowns worth of metal goods, yarn, aniline dyes, chemicals, machinery, and instruments.

From Denmark, Switzerland will import 74,000,000 crowns worth of goods, including 2,000 tons of butter, 20,000 carcasses slaughtered meat, 1,500 tons of bacon, 1,400 tons of eggs as well as fish, seed, and machinery. The prices for these items are considerably higher than those set forth in the Danish-English trade treaty recently concluded.

Not included in this treaty, the Swiss will import an additional 3,000 tons of butter and 2,500 tons of bacon to be paid for in dollars. If the Swiss market can take it, the Swiss reserved the right to import another 2,000 tons of butter.

If the Danes are able to export these additional quantities against dollar payment, Denmark will be able to add approximately $10,000,000 to her treasury which she can well use for necessary purchases in the United States.

SCHEDULE OF EVENTS

May

4- 6—American Oil Chemists Society, 39th annual meeting, Roosevelt Hotel, New Orleans.
5- 7—U. S. Brewers Foundation, 72nd convention, Hotel Traymore, Atlantic City, N. J.
9-11—National Peanut Council, annual convention, St. Petersburg, Florida.
10-12—Millers National Federation, annual convention, Edgewater Beach Hotel, Chicago.
10-14—Society of American Bacteriologists, annual meeting, Nicollet Hotel, Minneapolis, Minn.
13-15—Southeastern Frozen Food Locker Association, annual convention and exposition, City Auditorium, Atlanta, Georgia.
17-21—Association of Operative Millers, annual convention, Morrison Hotel, Chicago.
23-26—Flavoring Extract Manufacturing Association, 39th annual convention, Hotel Pennsylvania, New York.
23-27—Super Market Institute, 11th annual convention, Hotel Stevens, Chicago.
23-28—American Association of Cereal Chemists, 33rd annual convention, Netherlands Plaza Hotel, Cincinnati, Ohio.
27- —Fruit and Syrup Manufacturers Association, 31st annual meeting, Hotel Pennsylvania, New York.
31-June 1, 2—American Society of Refrigerating Engineers, spring meeting, Ocean House, Swampscott, Mass.

June

6- 9—Institute of Food Technologists, 8th annual convention, Benjamin Franklin Hotel, Philadelphia.
20-25—National Confectioners Association, 65th annual convention and 22nd confectionery industries exposition, Waldorf Astoria, New York.

July

12-18—Food and Agricultural Industries, VII annual international congress, Paris, France.

Changes in Food Supplies

(Indicators)

Production

Creamery butter production in February, estimated at 77,145,000 lb., was 18 percent under the February, 1947 output and 23 percent less than the 1942–46 average for the month. Production in January was 79,080,000 lb., which was actually 4 percent below the February daily average, due of course, to the shorter month.

American cheese output, during February, totaled 47,005,000 lb., an increase of 3 percent over January, but 20 percent under February, 1947 and 7 percent below the five-year average for the month.

Ice cream production was estimated at 31,125,000 gal., in February. This was 17 percent under the February output last year, but was 28 percent above the five-year average.

Wheat flour production came to 24,200,000 sacks, in January, a 13 percent drop from January, 1947, but 3 percent more than was produced in December.

Canned tomato pulp and puree, packed in 1947, came to 4,414,326 cases, 6-10 basis, according to the National Canners Association. This is less than half the previous year's record pack of 9,321,000 cases, on the same basis.

Liquid egg production, in January, totaled 14,850,000 lb., far below the 51,952,000 lb. turned out in January, 1947.

Dried egg output, during January, came to only 552,000 lb., which compares with 11,841,000 lb. produced in January a year ago. Production consisted of 392,000 lb. of whole egg, 91,000 lb. of dried albumen, and 69,000 lb. of dried yoke.

Frozen egg production, in January, was 15 percent larger than the January production, last year. Output totaled 10,739,000 lb., compared with 9,338,000 lb. produced in January, 1947.

Canned apples totaled 2,242,168 actual cases, in 1947, a drop from the 3,301,454 actual cases produced in 1946. Canned applesauce was also down in 1947, when 5,991,602 actual cases were turned out, as against 8,839,844 cases in 1946. Apple juice production was 1,180,769 cases, last year, compared with 3,524,282 cases in 1946.

Materials

Breadgrain (wheat and rye) harvests in Europe may equal, or possibly exceed 1946 production if weather continues normal. Output, however, will still be considerably below prewar averages.

Pea acreage for the coming season is indicated in early estimates at 1 percent more than was planted last year. This is about 17 percent less than the record high 1946 plantings, but is about 11 percent above the 1937–46 average.

Chicks hatched by commercial hatcheries during February, totaled 95,777,000, the smallest month since 1941, 21 percent below last year's February output, and 20 percent below the 1942–46 average for the month.

Storage

Public cooler occupancy declined contra seasonally in February, going from 69 percent on February 1 to 64 percent on March 1. Normally occupancy increases about 1 point during February.

Public freezer occupancy, at 81 percent on March 1, also showed a greater than seasonal decline for the month. Occupancy, however, was 3 points higher than average for March 1.

Indexes

Business Week's index of business activity dropped to 180.9 for the week ending April 3, which compares with 185.3for the preceding week, 191.4 the previous month and 189.7 a year ago.

The commodity price index on food, compiled by the New York Journal of Commerce stood at 162.2 for the week ending April 10, 161.8 for the preceding week, 161.4 for March, and 192.8 for April, 1947.

CONSTRUCTION NEWS

	Pending	Awarded April (thousands)	Total Awarded 1948 (thousands)
Bakery	$68	$300	$520
Beverages	1,539	688	'6,619
Canning and Preserving	15,000	....	320
Cold Storage	75	....	460
Confectionery	1,068	....	225
Grain Mill Products	805	....	4,057
Ice, Manufactur'd	....	....	....
Meats and Meat Products	238	100	651
Milk Products	136	155	2,023
Miscellaneous	1,076	303	5,191
	$20,055	$1,546	$20,066

FEED YOUR FIRES WITH

COAL

SENECA

The SENECA trade mark has always been a symbol of Dependability . . . to the industrial users of coal for heat and power.

If you are not already a member of the Seneca "tribe" let SENECA help YOU in the solution of your fuel problems.

A call will bring you Prompt and Efficient SENECA Service.

Today more than ever before the food industry needs a dependable source of supply for

COAL

SENECA COAL & IRON CORPORATION

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What's your

PACKAGING PROBLEM?

If you want a simple... dependable ... economical solution for your packaging problems, check with Union Special. For more than fifty years, Union Special has worked in close cooperation with makers of bags, conveyors, and bag filling and weighing equipment to produce specially designed bag closing machines that meet the needs of industry. Union Special equipment includes machines for closing bags of all types and sizes. Experience gained in handling bag closing problems in many different fields is your assurance of complete satisfaction. Ask for recommendations on your particular problems. Literature on request. UNION SPECIAL MACHINE CO., 450 N. Franklin St., Chicago, Ill.

Union Special

Bag Closing Machines

What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

"UNCHANGEABLE" CHANGES — Nature was thought to have fixed the character of egg protein beyond influence. Now we know differently. By suitable feed modification Department of Agriculture specialists have discovered how to modify the supposedly unchangeable protein within the egg white. The varying of the protein in the feed between casein and soybean meal determines egg composition and the prospective characteristics of the chick when hatched. Preliminary work points at the difference in contained amino acids from these two feed sources. Such a fundamental development indicates that research may do great things for numerous food animals. Certainly the poultry and egg business will have to appraise and utilize these results.

QUANTITY PRICING — Not satisfied with present anti-monopoly operations, Senator Murray proposes a supplemental law which he calls an "Independent Merchants Act". If enacted, not too likely this year, the bill would further restrict quantity discounts on price by rather rigidly defining large-scale sales discounts which obviously may aid the big and are then to the disadvantage of the small merchant. Food manufacturers had better watch this bill, S. 2227.

TECHNOLOGIC AID — Bakers are being urged to eliminate consignment selling. "Voluntary" agreements are being almost forced on the industry by Washington. Fortunately, anti-staling chemicals are now available to give long fresh life to baked goods. Perhaps Uncle Sam's urging for conservation of grain products may speed up the development of these intriguing new bread components.

CHEMISTS WANTED: — Uncle Sam wants to hire chemists at $3,400 to $5,900 per year. This includes analytical, biochemical, and other types. Employers of such professional folk can well study the Civil Service definition of grades and salaries as they judge the scale applicable to the food company professional staff.

A REAL DUTY — The Attorney General has been quarreling with the boards of directors of two big firms in which Uncle Sam is principal stockholder. Many on these boards, which happen to be of rayon companies, resigned because they could not go along with restrictions imposed by Washington on price increases intended to meet rising production costs. The Assistant Attorney General handling this project explains the official stand on the sanctimonious ground of preventing inflation as follows: "The Department of Justice considers it a real responsibility of business to do what it can to stem the tide of inflation, and that the boards of directors should consider these matters as well as the interests of the investing stockholders, but that there was no necessary conflict between the two since the financial health of the country is a matter of concern to business."

SOLE PURPOSE — Canned milk producers found it necessary to form a new export trade association under the Webb Pomerene Law. The old one became involved in certain foreign enterprise and dealt with problems other than "the sole purpose of engaging in export trade" which is the requirement of the Act permitting such groups to function. Uncle Sam is "right fussy" as to whether this detail is observed, all to prevent monopoly of course.

POCKETBOOK APPEAL — Washington notes with interest the continuance, apparently because it's effective, of appeals to consumers to buy certain processed foods to lower the cost of living. Apparently the time has passed when quality and palatability appeals work best alone. There are too many thin pocketbooks going to market. Hence reported great success from some companies' efforts to urge the buying of processed foods at a much lower cost per pound than for the comparable fresh foods. Fortunately the economy appeal can be accompanied by the quality appeal also. To be of maximum service it should be.

CHANGE OF ADDRESS

DIRECTOR OF CIRCULATION, FOOD INDUSTRIES
330 WEST 42nd STREET, NEW YORK 18, N. Y.

Please change the address of my Food Industries subscription.

Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

MEN • JOBS • COMPANIES

INDUSTRY

The Allen Packing Co., Vidalia, Georgia, has begun full-time operations in its new plant. Facilities are present to handle a kill of 500 hogs and 40 cattle per day at peak capacity. The sausage plant is equipped to turn out from 35,000 to 40,000 pounds of sausage, wieners, bologna, and other types of sausage in a 10-hour day.

Basic Food Materials, Inc., Cleveland, Ohio has announced the removal of their general offices, laboratories, and manufacturing plant from Cleveland to Vermilion, Ohio on April 1, 1948.

Bireley Bottling Co. of Buffalo, inc. has been incorporated in Buffalo, N. Y. with a capital stock of $250,000.

Chase Candy Co., Chicago, has purchased all of the common stock of O'Brien of California, Inc. which markets a line of candies packed in vacuum cans. Chase officials said there will be no immediate change in operation of the O'Brien Co.

The Florida Citrus Commission has authorized $5,000 as a starter to establish a nutritional research project with the Yale Nutrition Laboratories at New Haven, Conn. Studies will be made to establish the amount of several of the newer vitamins in fresh fruits, canned juices and concentrated citrus juice. Main emphasis will be on search for biotin, pyridoxine, inositol, and folic acid.

General Mills, Inc. has obtained a permit to build a new factory building at 4309 Fruitland Avenue, Vernon, California at a cost of $106,000.

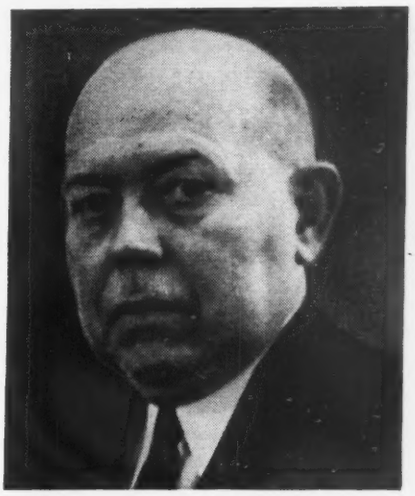
Hunt Foods, Inc. has begun construction of a 274,000 sq. ft. warehouse at Hayward, California as a part of a $2,750,000 expansion program scheduled for the first half of 1948. Completion is planned for July.

The Indiana Farm Bureau Co-Operative Association is setting up a chicken processing plant with a capacity of 1,000 birds processed an hour and 3,000 cases of eggs graded weekly at Hayden, Indiana. The plant will employ between 100 and 125 persons and will be housed in a one-story building formerly occupied by a canning factory.

The Kraft Food Corporation has leased the long idle cheese factory building at Malone, N. Y. from Sheffield Farms, Inc. It is expected that Kraft's operation at the local plant will be confined to cheddar, or American type cheese.

Laura Lee Candy Co., Miami, Florida has moved into a new modern, air-conditioned plant built at a cost of $175,000. The company began in 1939 as a small project and has grown into one of Miami's outstanding industries.

DONALD D. PASCAL



HERBERT C. PIEL

Newly-elected vice-presidents of National Starch Products Inc. Mr. Pascal since joining the company in 1929 has been connected with many operating departments. He will direct the research and development program. Mr. Piel comes from a pioneer family in the starch industry and joined the company in 1907.

Le Page's, Inc., Gloucester, Mass., glue manufacturers purchased on March 15 the Faires Manufacturing Co., Decatur, Illinois for an estimated $200,000. It is planned to make a new adhesive product from corn starch.

Milk Plant Specialties Corporation has purchased a two-story factory building in Rochester, N. Y. for $23,000.

Shiriff's Ltd., Toronto, Canada is planning to spend $207,000 in expansion of its manufacturing and warehousing facilities.

Red Dot Foods, Inc. is planning to move its factory facilities from St. Paul, Minn. to Minneapolis.

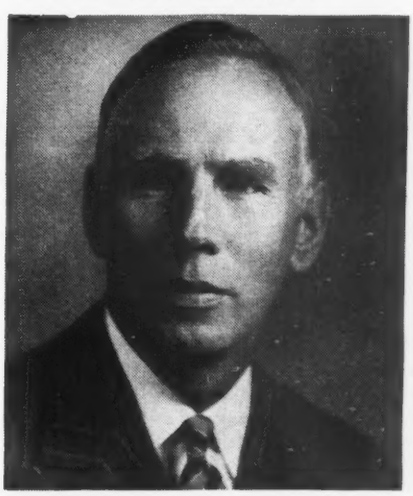
Valley Holding Co. has purchased the evaporating plant at Cowiche, Oregon which was operated for many years by Mr. and Mrs. George Hallauer. $100,000 was reported to be the price of sale.

The Welch Grape Juice Co. has begun construction of a $1,000,000 processing plant for grape berries and soft fruits at Wenatchee, Wash.

Laing & Sons candy factory at Hamilton, Ontario, Canada was recently gutted by a fire causing damages estimated at more than $100,000.

I. H. KEMPNER, JR.

Former vice-president and treasurer of Imperial Sugar Co., I. H. Kempner, Jr. was elected president. He succeeds his father who is now chairman of the board.



PHILLIP M. CLARK

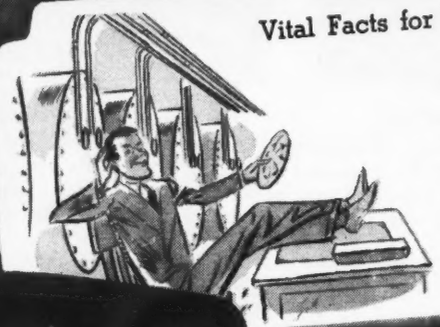
Elected president of the New England Confectionery Co., Phillip M. Clark is a grandson of one of the original founders. He has spent his entire business career with Necco.

"Sure-fire" Recipe
for Reducing Costs

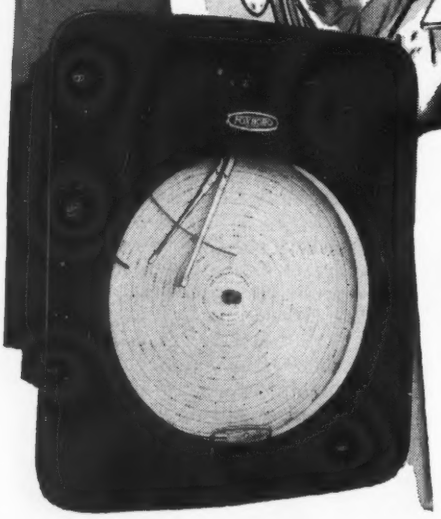
You may be a baker, a brewer, a candy maker, a meat packer . . . no matter what type of food processor you are . . . if your plant operations involve temperature, pressure, humidity or other process variables, *modern instrumentation* by Foxboro can help you reduce costs.

Foxboro Instrumentation is usually very simple because it is expertly engineered to each process. It *simplifies* complicated processes. Applied to its full capabilities, it cuts fuel consumption, saves scarce and costly ingredients and eliminates unproductive duties of operators. Three typical examples are shown below.

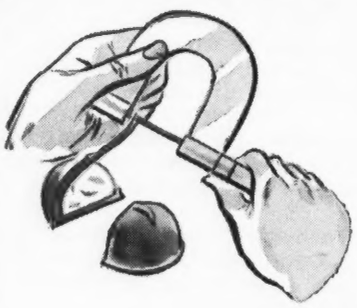
Vital Facts for Brewmasters



Temperatures in fermentation tanks are recorded *automatically*, and thus maintained more *accurately*, with the Foxboro Dynalog Electronic 24-point Recorder. The outstanding sensitivity and speed of this instrument provide accurate temperature readings from 1 to as many as 24 separate tanks, making hourly records of each one, automatically and in sequence. Its simplicity assures practically maintenance-free service.

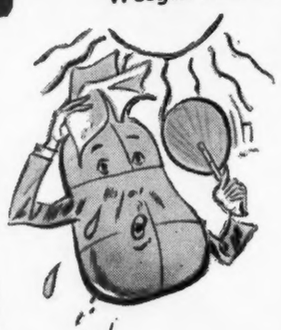


Calipers for Chocolate Coating



The thickness of chocolate coating can be controlled to an extremely fine degree when the temperature of the chocolate is continuously measured by a Foxboro resistance bulb Dynalog Recorder (or Controller). These simplified electronic instruments may be used with equal efficiency on enrobers or hand-dipping kettles.

Weight-and Flavor-Saver for Meat Packers



For ham and sausage curing rooms, Foxboro's latest development to record or control humidity offers many practical advantages. It combines the exclusive features of Dynalog Electronic Instruments with those of the unique new Dewcel bulb which permits direct recording of dewpoint. Installation and maintenance are extremely easy. No water piping, wick changing or air blowing required. If desired, absolute humidity can be determined readily by using a simple conversion table.

FOXBORO DYNALOG INSTRUMENTS

These are the *only* instruments designed to take full advantage of electronic circuits . . . resulting in fewer moving parts; faster, more accurate response; freedom from maintenance. Require no lubrication and only infrequent replacement of standard radio tubes available at local radio store.

NEED A COST-CUTTING RECIPE? Let Foxboro recommend modern instrumentation to fit your specific process. WRITE TODAY . . .
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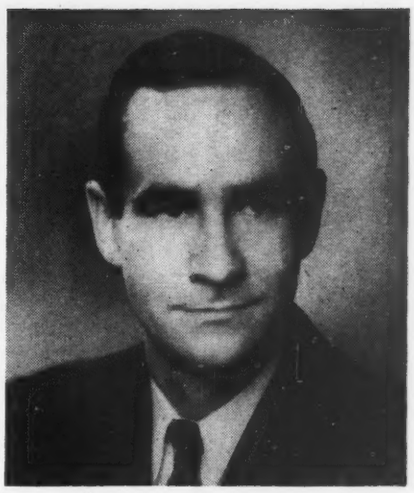
EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE



JOHN S. GOLDSMITH

Newly-elected vice-president of John H. Dulany & Son, Inc., John S. Goldsmith started as a technologist in 1940.

PERSONNEL

Harry Baccigaluppi, well-known wine grower of Delano and San Francisco, was elected president of the Wine Institute at the 14th annual membership meeting held in San Francisco.

B. W. Beadle, formerly in the research laboratory of American Meat Institute, Chicago, Ill., resigned, April 1, to become director of George W. Gooch Laboratories, Ltd., Los Angeles.

Dr. Robert E. Buck has been appointed head of the process and products research laboratory, research and quality control division, of the H. J. Heinz Co. Prior to joining the Heinz staff, Dr. Buck served with the U. S. Quartermaster Food and Container Institute, Chicago.

Dr. Conrad A. Elvehjem, professor of biochemistry, University of Wisconsin, has been elected the 1948 Nicholas Appert Medalist of the Chicago Section, Institute of Food Technologists. The award will be made at the Annual Conference of the Institute to be held in Philadelphia, June 6-9.

Dr. James E. Gates, formerly assistant to the director of container division, War Production Board, and later consulting economist to Container Corp. of America, is now on the consulting staff of Container Laboratories, Chicago, Ill.

A. Irving Grass of the I. G. Grass Noodle Co., Chicago, Illinois was re-elected president of the National Soup Mix Association at its annual meeting in Chicago.

Orlin C. Harter of the Harter Packing Co., Yuba City, Calif., was elected president of the Canners League of California by the board of directors at the annual convention. E. W. Eames of

"Automatic" Sprinkler
FOR INVESTMENT PROTECTION
"Automatic" Sprinklers
SERVE GEORGIA
HUB
of the
SOUTH
Throughout the state of Georgia . . . the South . . . in fact, throughout the country at large, "Automatic" Sprinkler serves business, commercial and industrial alike.
From a small beginning back just before the turn of the century, "Automatic" Sprinkler has steadily risen in importance and is today the recognized leader in the field of fire protection. At the time of its origin, "Automatic" Sprinkler established a definite course of action from which it has never deviated — to design, produce and install equipment that would answer the need for complete and adequate fire protection, no matter what the hazard.
Owners of "Automatic" Sprinkler protected properties have been paid handsome dividends on the basis of this policy. They will continue to profit, for singleness of purpose, coupled with intelligent and persistent research, has resulted in fire protection that truly serves through the saving of lives and property as well as present and future earnings.
You will find it wise to plan adequate fire protection for your property now and, in that planning, be sure to include "Automatic" Sprinklers an important investment today . . . perhaps welcomed protection tomorrow.
"Automatic" Sprinkler
FIRST IN FIRE PROTECTION
DEVELOPMENT · ENGINEERING MANUFACTURE · INSTALLATION
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO
OFFICES IN PRINCIPAL CITIES OF NORTH and SOUTH AMERICA

the California Packing Corp. and L. J. Taylor of Libby, McNeill & Libby were re elected industry vice-presidents.

R. C. Haven, formerly safety engineer at Continental Baking Co., New York has resigned to join the Langendorf United Bakeries, San Francisco. He will be succeeded by W. C. Mahlstedt.

Dr. E. E. Hays, formerly of the College of Medicine, University of Vermont, and for the past year an associate in biochemical research with Armour and Co., Chicago, has been selected director of biochemical research in the chemical research and development department. He succeeds Dr. F. C. Koch, deceased.

J. J. Johnson, formerly president and general manager of the All American Food Products, Inc., Ferndale, Michigan, which he founded, has been appointed registrar of the Carnegie Institute.

Lt. Col. Joseph S. Kujawski, QMC, has been assigned to the staff of the Quartermaster Food and Container Institute for the Armed Forces, Chicago.

Dr. W. A. Lazier has resigned as director of the Southern Research Institute, Birmingham, Alabama to join the research staff of Charles Pfizer & Co., Inc., Brooklyn.

Ray W. Mathes, manager of the Spokane plant of Sunshine Biscuits, Inc. has been officially retired as of April 1, 1948.

Joseph Matthews, Jr. was recently elected president of American Cone & Pretzel Co., Philadelphia. He succeeds the late L. J. Schumaker who died January 1.

Richard William Millar, chairman of the board of Northrop Aircraft, Inc., has been elected a director of Hunt Foods, Inc.

Edward W. Shineman, formerly treasurer of the Beech-Nut Packing Co., has been named chairman of the board of directors of the company. He succeeds the late F. E. Barbour.

Roland L. Sinclair, executive of Kingan & Co., Ltd., and J. & T. Sinclair & Co., Ltd., in Belfast, Northern Ireland, has just concluded a three week visit with the executives of the American Kingan & Co. offices and plants in Indianapolis, Indiana.

C. A. Wood has been named manager of the newly-opened Oakland, Calif. plant of Wm. J. Stange Co. He is well known to food processors on the West Coast, having been in the industry there for the past 20 years.

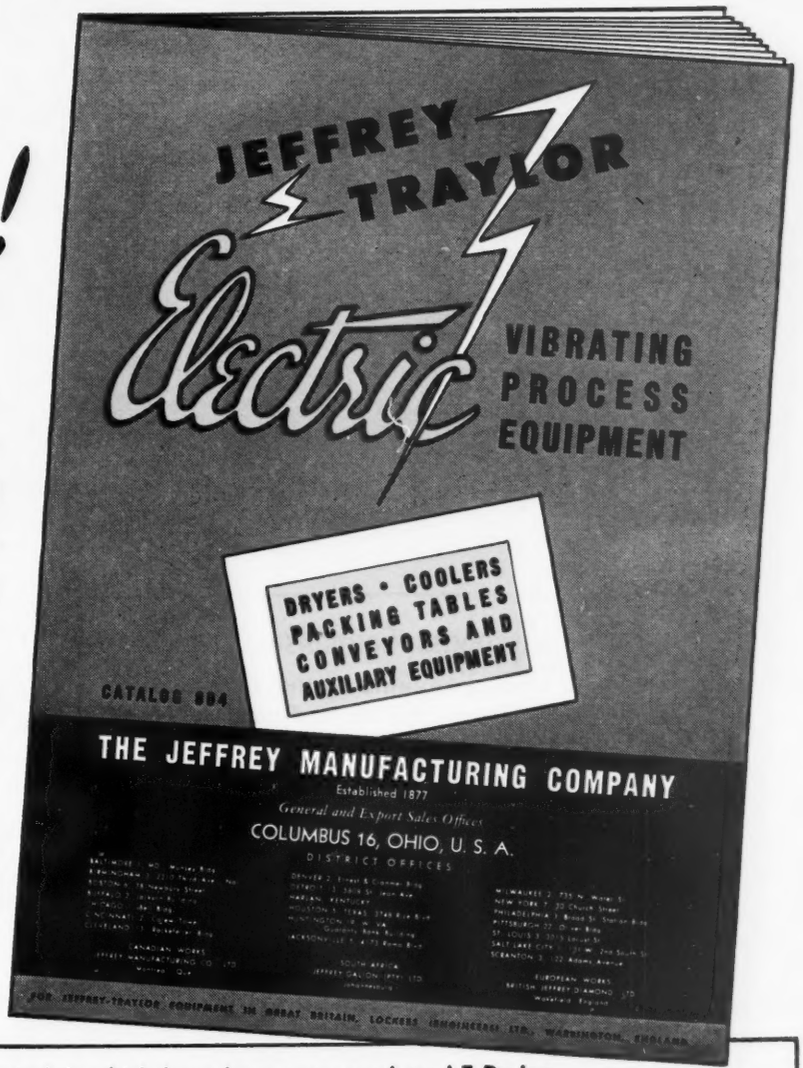
Hoover C. Sutton has been elected a director of the General Ice Cream Corp. He succeeds Dr. Carl A. Larson who becomes a secretary of the National Dairy Improvement Institute.

IF YOU'RE INTERESTED IN
DRYING—COOLING—CONVEYING—PACKING

Get this New Catalog!

It illustrates and tells how "Jeffrey-Traylor" electric vibrating equipment is serving the chemical, food and drug industries, as well as many others (see list of materials which have been processed).

This new 54-page Catalog No. 804 shows how flexibility in design, easier operation and greater control enables J-T equipment to follow through in many processing operations.



Send Coupon Today

Some materials which have been processed on J-T Drying and Cooling equipment:

CHEMICAL SALTS: Amorphous, Anhydrous, Crystalline, Hydrates. **FOODS:** Cereal & Grains, Chocolate Products, Flour, Flour Products, Milk Products, Salt, Sugar, Sugar Products. **DRUGS:** Granulation Forms of: Alkaline Compounds, Nicotine Compounds, Organic Compounds, Phosphate Compounds, Sulpha Compounds. Crystal Forms of: Citric Acid Salts, Copper Sulphate, Epsom Salts, Ferrous Sulphate, Potassium Iodide, Sodium Salts, Sugars. **MISCELLANEOUS:** Abrasives, Anthracite Coal, Bath Salts, Bauxite, Calcines, Cement Clinker, Crushed Alloys, Fullers Earth, Glass Cullet, Minerals & Ores, Oyster Shells, Plastics, Sand, Sewing Machine Needles, Soap Powders.

The Jeffrey Manufacturing Company
927-99 North Fourth St., Columbus 16, Ohio

Please send me Catalog No. 804

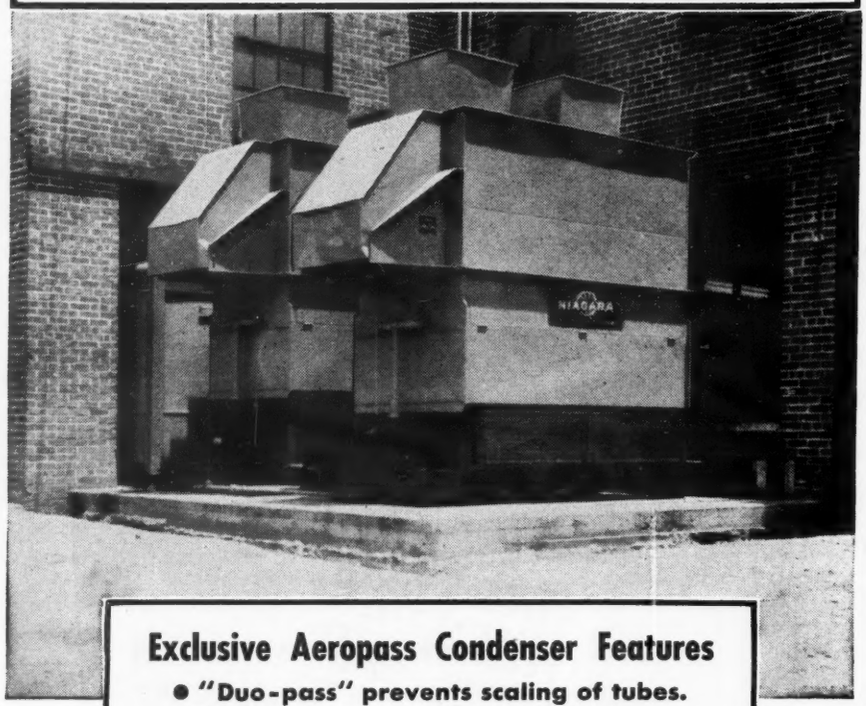
Name .....

Position .....

Company .....

Address .....

This Condenser INCREASES Refrigeration Plant Capacity



Exclusive Aeropass Condenser Features

- **"Duo-pass" prevents scaling of tubes.**
- **"Oilout" keeps out oil and dirt.**
- **"Balanced Wet Bulb Control" keeps head pressures down.**

● Dirt and scale in condensers is the great enemy of efficient refrigeration systems. Not only is it the greatest trouble-maker for the operating engineer, but it also cuts capacity and wastes power.

Correct this by installing the Niagara Aeropass Condenser. It lowers condensing temperatures, keeps the system free of oil and dirt and controls the operation of your system to give you *constantly* the minimum differential between head pressure and suction pressure.

These benefits LAST because the patented Niagara "Duo-Pass" lowers the refrigerant temperature to the point where scale cannot precipitate on condenser tubes, assuring an always clean, always efficient condenser.

Write for Descriptive Bulletin 103-F.I.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

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Field Engineering Offices in Principal Cities

INDUSTRIAL COOLING • HEATING • DRYING

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HUMIDIFYING • AIR ENGINEERING EQUIPMENT

DEATHS

Walter E. Berghoff, 51, president of Hoff-Brau Brewing Corp., Fort Wayne, Ind., recently, in Fort Wayne.

Edward W. Chandler, retired president of the Creamery Package Mfg. Co., March 14 at Pomona, Calif. where he had resided for the last few years.

George T. Chester, 90, formerly associated with the Thornton & Chester Milling Co. of Buffalo, Feb. 26 in Pasadena, Calif.

Otto C. Kahl, 53, a food broker in Buffalo for over 30 years, Feb. 25 in Buffalo.

Charles E. Pearson, retired Providence manager for Wilson & Co., March 12, in Providence, R. I.

George Y. Sawyer, president and treasurer for 22 years of the Murray Co., Boston, Mass., March 21 at Swampscott, Mass.

ASSOCIATED INDUSTRIES

The Association of American Soap & Glycerine Producers announced the appointment of J. Malcolm Miller as acting secretary of the association.

The Baker Ice Machine Co., Inc. announced the election of Mr. C. Hickock as a director of its subsidiary, The Northwest Baker Ice Machine Co., Inc. of Seattle, Wash. Mr. Lee C. Leslie was also appointed district manager in charge of the company's St. Louis office.

Bemis Bro. Bag Co. has formally appointed H. C. Davis manager of the paper specialty plant and Walter A. Kamp as sales manager of the same organization.

Continental Can Co., Inc. has purchased one of the former Wright Aeronautical Corp. plants in Paterson, N. J.

J. L. Ferguson Co., Joliet, Illinois has announced the election of its sales director, H. Lyle Greene, to the position of president.

Link Belt Co., Chicago has announced the establishment of district sales offices in Charlotte, N. C. and in Jacksonville Florida.

Reynolds Metals Co. has appointed Mr. George E. DuCharme as can industry manager with headquarters in the Reynolds New York office.

The Steamaster Automatic Boiler Co. of Los Angeles, has announced the opening of a mid-western branch office in Chicago with Joseph Sullivan in charge.

The New, SNOW-WHITE
Frozen Food Carton by MARATHON

MEMO
This recent ad announced the sensational new snow-white carton for frozen foods — an outstanding paperboard product by Marathon.

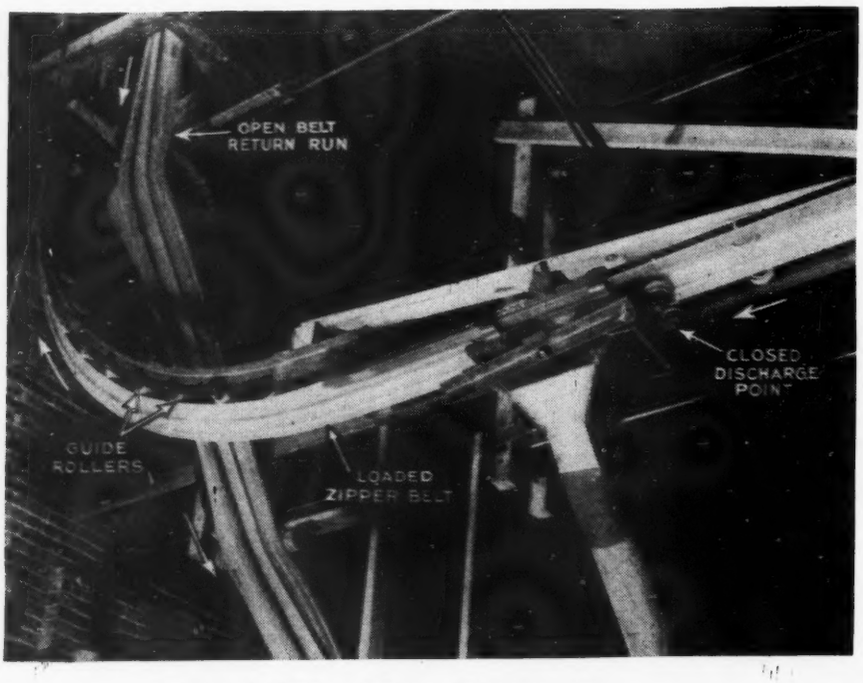
Fit for the Finest Foods!

Here at last is a *snow-white,* sanitary carton for top quality frozen foods. A carton that carries the impression of purity and cleanliness right into the housewife's kitchen. Made from pure white laminated solid bleached paperboard, this Marathon one-piece carton provides a triple-barrier against moisture vapor loss. Gives *positive* protection to the flavor, freshness and nutritive value of your products. Precision built for automatic packaging. Available now for the 1948 pack. Ask your Marathon salesman or write Marathon Corporation, Menasha, Wisconsin.

MARATHON PROTECTED BY MARATHON

Samples mailed on request

FOOD EQUIPMENT NEWS

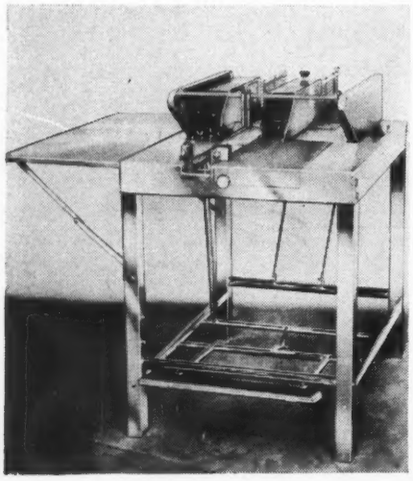


Material Handling Zipper Conveyor

A BULK material handling conveyor known as "The Zipper" has been announced by the Stephens-Adamson Mfg. Co., Dept. I, Aurora, Ill. It is called the zipper because the opening and closing of the side-walls of the belts are accomplished exactly as the name implies. It permits carrying the material in any direction and in any plane. The loaded 4-in. zipper belt carries .07 cu. ft. of material per ft. of belt travel. Capacities may be figured for belts travelling at speeds from 1 to 200 f.p.m. The belt is made up of flat base belt on which two side-walls are hinged. Closed they form an inverted U-shaped section.

Adjustable Packer

A FULLY adjustable overwrapping machine, that permits the operator to wrap packages of from one to twenty different sizes by simply changing the size adjustment on the machine, has been announced by the Howard Engineering Co., Dept. I, Los Angeles, Calif. It is built of stainless steel and chrome throughout, capacity 1,200 to 1,800 packages per hr. The heat-sealing device is thermostatically controlled for Cellophane, wax paper, pliofilm, or other types of heat-sealing overwraps.



Pocket Thermometer

A NEW pocket thermometer, a "watchmaker's reduction" of the famous Weston Testing Thermometer, is announced by Scientific Glass Apparatus Co., Inc., Dept. I, Bloomfield, N. J. The thermometer has a stem ⅛ in. in dia. and 5 in. long. The dial is an inch in dia. and has an unbreakable plastic crystal. Four ranges are available—0 to 220 deg. F., 50 to 500 deg. F., 0 to 150 deg. C. or 0 to 250 deg. C.

Cleans Concrete Pores

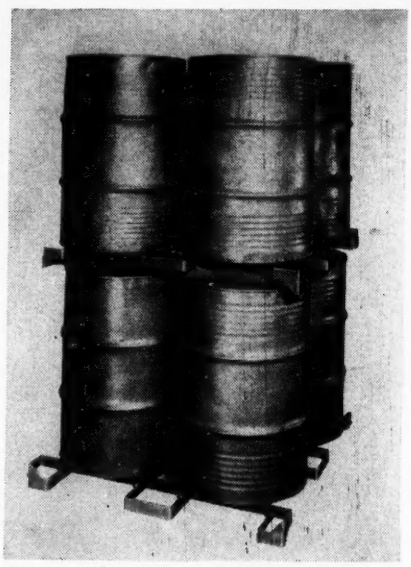
A PRODUCT that removes grease and oil from concrete, regardless of how deep it has penetrated into the pores, has been developed by Steelcote Mfg. Co., Dept. I, St. Louis 3, Mo. The material is poured on or applied to the surface and brushed in, then rinsed off with water. All grease and oil and resultant stains disappear and the concrete looks like new again. The surface is automatically etched ready for painting if this is desired. A companion product has also been developed and is offered for sale to close the pores of concrete after it has been cleaned, eliminating the possibility of restaining.

Floor Enamel

A RUBBER-BASED, 1-hr. drying floor enamel, that is said to reduce accidents due to skidding on floors, is announced by The Wilbur & Williams Co., Dept. I, Boston 15, Mass. Designed especially for heavy traffic conditions found in factories, schools, hotels, institutions and homes, the enamel is supplied in 8 colors, plus black and white.

Skeleton Pallet

AN ALL-STEEL skeleton pallet is announced by Pacific Chain & Mfg. Co., Dept. I, Portland 10, Ore. This pallet combines light weight, durability, low first cost and low upkeep. Welded steel construction of a semi-open framework



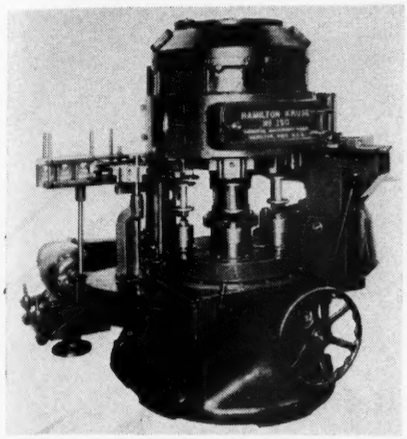
design produces a pallet weighing 65 lbs. that can be loaded or unloaded by fork trucks.

The standard size skeleton pallet for the handling and storage of 55 gal. drums measures 48 in. x 48 in. overall, and is particularly suitable for the palletizing and depalletizing of drums, barrels, and rectangular types of firm containers. Other sizes are made for various size drums and rectangular packages.

Automatic End Seamer

A NEW high-speed automatic end seamer for square and irregular shaped cans has been announced by the Lima-Hamilton Corp., Dept. I, New York City. Called the Hamilton-Kruse Model No. 150, this seamer is a completely automatic 4-head unit with 4 round rollers on each head In operation, the cans remain stationary on the base plate during the seaming.

Unit is equipped with automatic body and end feeds, a complete set of seaming parts, and its own motor and control.



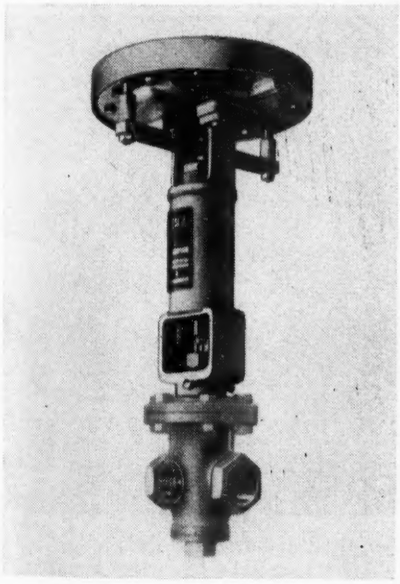
Features of the new seamer are rugged and precise construction, quiet operation, low speed heads, ease of adjustment, and automatic lubrication.

Electric Fork

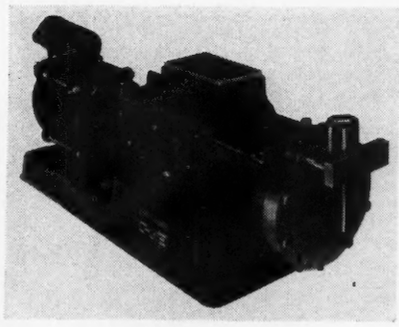
THE seventh in its line of battery-powered, handle-guided hand trucks, has been announced by the materials handling div. of the Yale & Towne Manufacturing Co., Dept. I, Philadelphia, Pa. The new Worksaver model is a non-tilting electric fork "walkie," available in 1,000 and 1,500 lb. capacities. Main features are: (1) low cost, (2) short turning radius, (3) light weight.

Superstructure For Valves

A NEW reversing superstructure for use on its diaphragm regulating valves, is announced by Leslie Co., Dept. I, Lindhurst, N. J. This new superstructure permits the reversing of the valve action by substitution of the standard superstructure. There is no need to remove the



valve body from the line. All metal parts, except the base, are bright finished. Base is 12 in. in diameter, rust-proofed underneath, and enameled a bright red on top for better visibility.

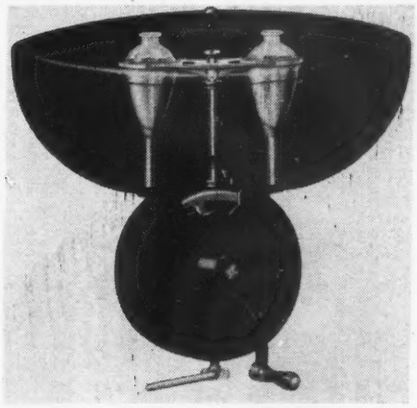


Proportioning Pumps

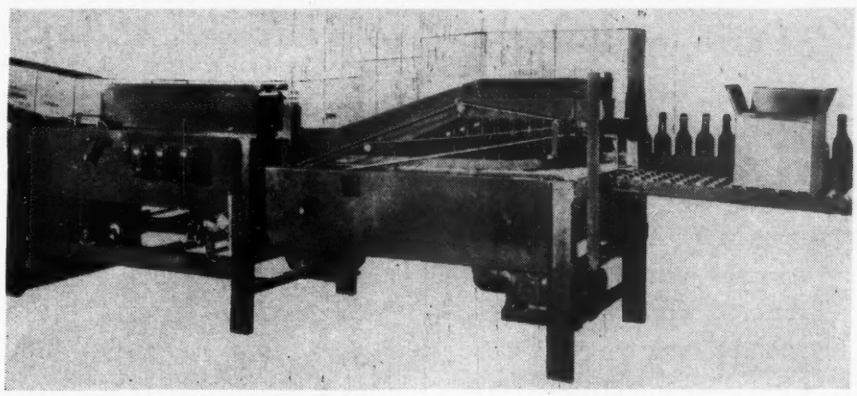
A LINE of Pulsafeeder proportioning pumps is announced by Lapp Insulator Co., Inc., Dept. I, Le Roy, N. Y. The pump is a combination piston-diaphragm unit. A piston reciprocating over a measured stroke displaces oil, which in turn pulsates a diaphragm. The hydraulically-measured pulsation of the diaphragm actuates the flow of the liquid being handled. Four sizes are available: No. 1, zero to 11 gph; No. 2, up to 40 gph; No. 3, up to 100 gph and No. 4 up to 330 gph. Duplex, triplex, and other multiple-head arrangements are offered for continuous blending or feeding.

Laboratory Centrifuge

A HEAVY duty hand power centrifuge designed to swing two or four 100-cc. tubes, with minimum effort, is announced by the Gerin Corp., Dept. I, Red Bank, N. J. Features include ball bearings throughout, and a 24-to-1 gear ratio. Outer dia.



of swing is 16 in. There is a stationary guard bowl to reduce air resistance and protect the operator from whirling parts. The entire unit can be stowed in the bowl when not in use.



Case Unloader and Unscrambler

A CASE unloading machine designed to automatically unload container-filled cases and place glass containers on the filling-machine conveyor in a single file, upright position, has been developed by the A-B-C Packaging Machine Corp., Dept. I, Moberly, Mo. It presents those who purchase any type of glass containers packed in re-shippable cartons with a speedy, economical way of removing the glass containers from the carton. It is estimated that this machine does the work of up to three persons—depending upon the speed of the conveyor system. No attendant is required as operation is fully automatic.

WRITE FOR MORE INFORMATION

Food Industries Reader Service will help you to obtain additional information about new equipment and new materials described in these pages. A memo from you, mentioning the items in which you are especially interested, will receive prompt attention. Send it to Reader Service, Food Industries, 330 West 42nd St., New York 18, N. Y. This offer is in lieu of the usual coupon request cards, which were omitted from this issue owing to the current emergency in the printing industry.

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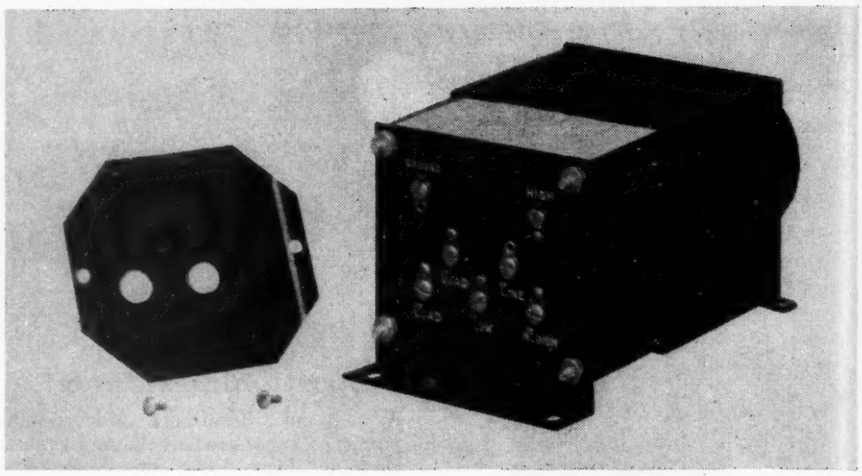
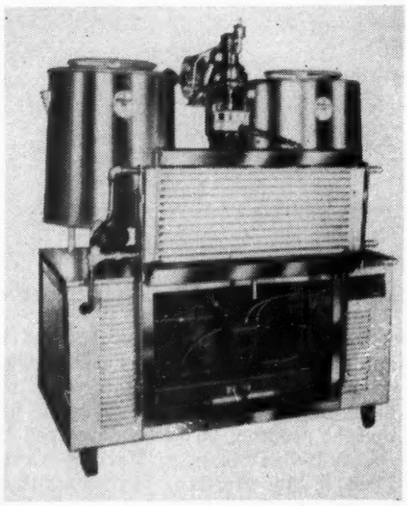


New Autotransformers For Refrigerators

A LINE of autotransformers designed to adapt standard 115-volt, 60-cycle hermetic refrigerator motors for use in 50-cycle and odd voltage applications has been announced by the General Electric Co., Dept. I, Schenectady, N. Y. The new units provide dependable motor operation under both starting and running conditions. They have been engineered to meet the varied requirements of the refrigerator export market based on a study of industry requirements. Units are available in 550-kva ratings for commercial refrigerators.

Mechanical Cow

A COST and time saving production machine known as the Mechanical Cow for bakeries and other food processors is announced by United Dairy Co., Dept. I, West Chester, Pa. With the Mechanical



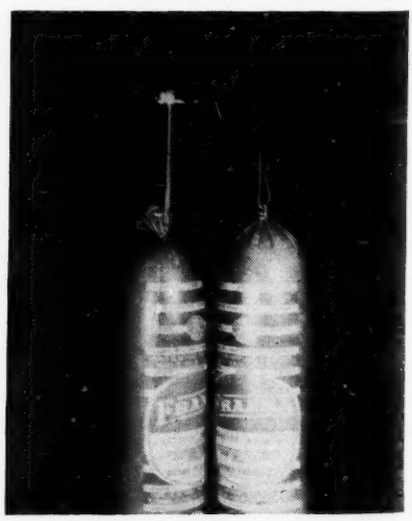
Cow to do the processing, the making of fresh milk, is relatively simple. It requires weighing out proper amounts of best quality ingredients of sweet butter and spray process skim milk powder and water. Heat may be either electric or steam.

Leakproof Valve

A PACKLESS valve which eliminates maintenance required with stuffing boxes and other means of preventing leakage, is announced by Fulton Sylphon Div. of Robertshaw-Fulton Controls Co., Dept. I, Knoxville, Tenn. It owes its leakproof performance and freedom from maintenance to the seamless metal sylphon bellows which forms a leakless connection between the valve disc and the valve body.

Casing Fastener

DEVELOPMENT of an improved artificial casing end-fastener machine, said to eliminate the need for string hanger ties and stockinettes and to guarantee straight hanging sausages, has been announced by Hercules Fasteners, Inc., Dept. I, Elizabeth, N. J. The machine, a refinement of one introduced last year, pleats the casing, crimps the pleated end with a metal band and punches a hole in the metal fastener through which a metal hanger can be inserted after the casing is stuffed. The weight of the sausage is



evenly distributed and the product hangs perfectly straight. Tearing or cutting is reduced to a minimum and the use of stockinettes is eliminated. Hangers can be kept clean for re-use by boiling. The machine is said to be capable of pleating and crimping casing ends at a rate of 600 per hr.

Are you using the best wrappers your money can buy ?

Is your product getting all the protection it needs? Does it have the attractive appearance you want it to have?

Here's what Patapar Vegetable Parchment offers you.

PROTECTION

Patapar gives you a wrapper that has high wet-strength—that resists grease. And being produced from pure cellulose it has no odor, no taste. Patapar safeguards natural flavor and freshness.

BEAUTY

Patapar has a rich white texture that is a joy to behold. Beautiful effects are obtained by printing it with bright colors, spotlighting brand names and selling messages. Our plants are specially equipped for printing Patapar economically by letterpress or offset lithography.

KEYMARK

The Patapar Keymark is nationally advertised as the symbol of wrapper protection. You are welcome to include it on your printed Patapar wrappers at no extra cost. It's a way to remind customers that your product is well protected.

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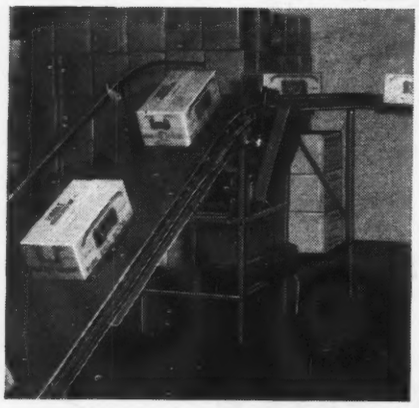
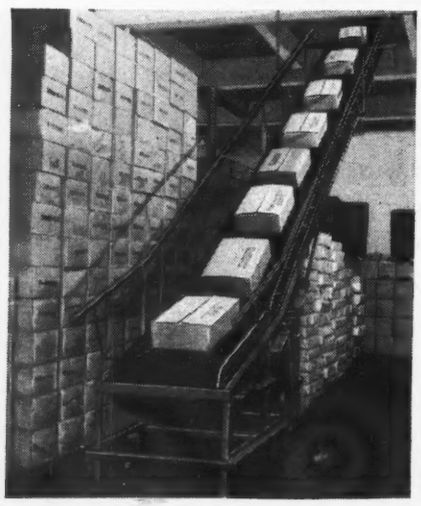
FROM
FLOOR-TO-FLOOR

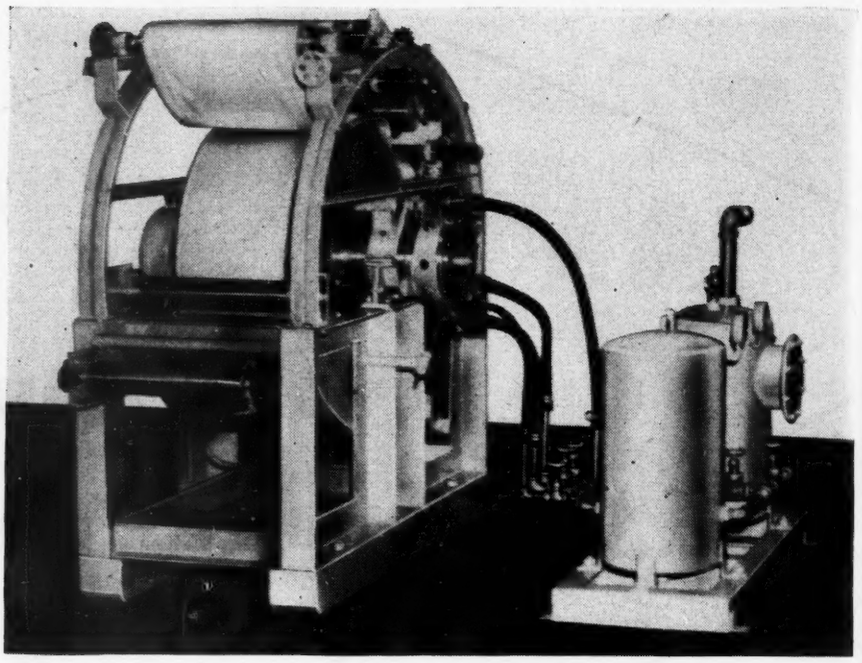


WITH EASE AND SPEED
ON
"STREAMLINER"
INCLINED
BELT CONVEYORS

These economical, efficient Floor-to-Floor Conveyors for handling packages, cases, cartons, etc. are available in two types: Heavy Duty, with a load capacity of 85 pounds per foot and Light Duty, with a load capacity of 50 pounds per foot. Both types are reversible . . . operate at a constant speed of 45 feet per minute . . . have roller bed construction with rollers "Set High" or "Set Low" . . . are equipped with rough top rubber belt and manual belt take-up for slack. They are available in standard sizes up to 30 inches wide and can be furnished portable or supported from one floor. Write for details.



HARRY J. FERGUSON CO.
WHEEL • PORTABLE BELT • BELT AND ROLLER GRAVITY CONVEYORS
123 WEST AVENUE, JENKINTOWN, PA.

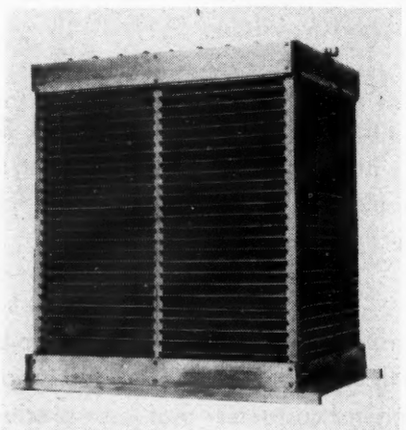


Pilot Plant Rotary Vacuum Filter

A STAINLESS steel pilot plant continuous rotary vacuum filter having a 3 ft. drum dia. and 1 ft. drum width has just been announced by Filtration Engineers, Inc., Dept. I, Newark 4, N. J. It is equipped with the FEinc String Discharge which handles difficult cakes cleanly, efficiently and with longer cloth life. The FEinc washing mechanism is supplied with the filter. It can be disconnected, however, for those applications where washing is of no practical value. This unit may be obtained on a new rental-purchase plan announced coincident with the filter.

Small Cooling Tower

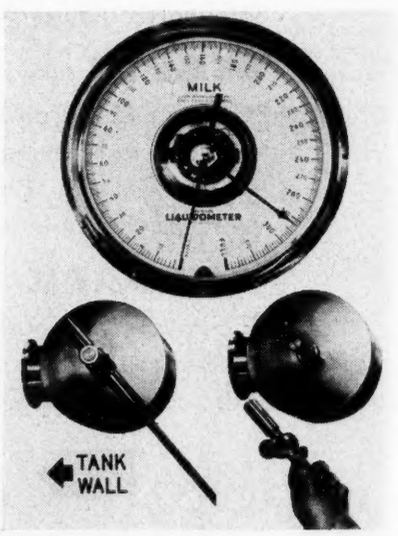
A SMALL natural draft cooling tower (The New Series 100 Tower) is announced by The Marley Co., Inc., Dept. I, Kansas City, Kan. They are offered in 6 frame sizes to give from 4-36 tons refrigeration depending on local wet bulb conditions. Towers are prefabricated and shipped knocked down with every member piece marked.



Milk Tank Gage

A NEW milk tank gage incorporating extreme accuracy, freedom from bacteria-encouraging crevices and materials, and easy cleaning of the unit is announced by the Liquidometer Corp., Dept. I, Long Island City, N. Y.

It consists of a round, polished stainless steel housing permanently attached to the inside wall of the tank. Permanent magnets are completely enclosed inside the housing, to which is attached a removable one-piece float and arm. The float arm is magnetically held in working position and is removable for cleaning.



Dial graduations indicate tank volume in terms of cans or any other desired unit of measurement.

Portable Belt Conveyor

A NEW 15-ft. portable belt conveyor is announced by the Sage Equipment Co., Dept. I, Buffalo 13, N. Y. Each end can be raised and lowered by positive hand

ELECTRUNITE
STAINLESS STEEL TUBING

Available in Types
302
304
316
317
347
309-S
310
430
Other Analyses for Special Applications Upon Request

● Long service life is a primary advantage of Republic ELECTRUNITE Stainless Steel Tubing that pays profitable dividends on your original investment.

Made of long-lasting ENDURO Stainless Steel, this tubing provides the resistance to heat and corrosion, minimum maintenance expense and sanitary advantages of stainless steel. And as made by Republic's improved welding processes, each length is uniformly round and sound, free from rolled-in scale and scale pits. *Full annealing* of all but ornamental grade assures unvarying high ductility throughout every length—throughout every shipment.

For complete information about these and the many other cost-saving advantages of Republic ELECTRUNITE Stainless Steel Tubing—including a list of sizes, gauges and analyses—write *today* to:

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Absolutely clean and of highest purity, fine-flaked Tepco Sodium Benzoate U.S.P. also gives uniformly BETTER SOLUBILITY.

Processing our sodium benzoate from coal from our own mines, through our own chemical plants, we are able to assure our customers a dependable supply at all times.

PROMPT SERVICE TO ANY PART OF THE U. S.

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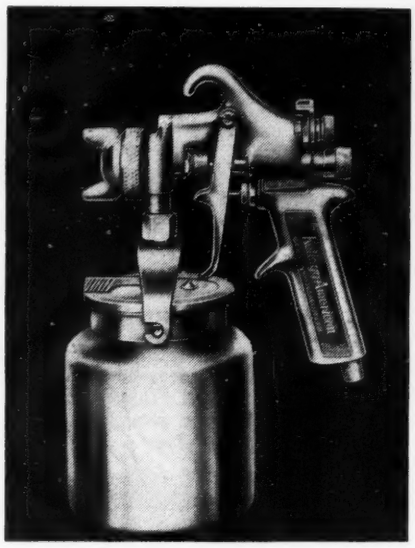
wheel. Unit is built with 24 in. wide, 3 ply solid woven cotton duck belt, and floor locks in order that machine will not move when placed into position. Belt is reversible and will move material in either direction. These units are also built according to customer specifications to meet the individual requirements.

Micro-Spray Paint Gun

A NEW paint spray gun has been announced by American Brake Shoe Company, Kellogg Division, Dept. I, Rochester, N. Y. A smooth, high-gloss finish is produced by fine atomization. Even paint distribution is made possible by



uniform flow of air and paint. Simplicity of design saves expensive cleaning and assembly time. The entire head can be quickly removed as a unit by merely removing the locking screw and lock nut. One fluid needle is required for all paint spraying.

Maintenance Tool Kit

AN all-purpose tool kit, which facilitates the installation and repair of industrial

equipment and machinery has just been announced by Ingersoll-Rand Co., Dept.

Compare NEW DODGE "Job-Rated" TRUCKS feature for feature!

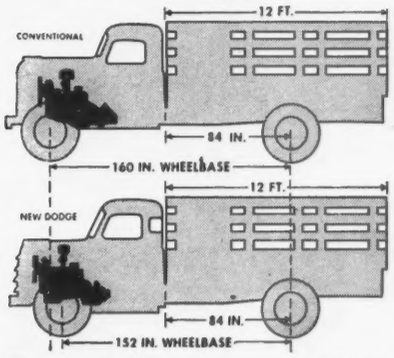
Read this 10 Point Comparison

(Dodge Model F-152; 14,500 pounds Gross Vehicle Weight—and Comparable Competitive Models.)

FEATURES AND ADVANTAGES	DODGE "Job-Rated" TRUCK	TRUCK "A"	TRUCK "B"	TRUCK "C"	TRUCK "D"
Wheelbase	152 in.	161 in.	158 in.	159 in.	161 in.
Cab-to-Axle—to take 12-foot body	84 in.	84 in.	84.06 in.	84 in.	84 in.
Wide-Tread Front Axles (shorter turning—more stability)	62 in.	56 in.	60.03 in.	58⅜ in.	56 in.
Modern "Cross-Type" Steering	Yes	No	No	No	No
Turning Diameter * —Left —Right	50½ ft. 50½ ft.	61½ ft. 61½ ft.	60½ ft. 54½ ft.	54½ ft. 54½ ft.	66½ ft. 66½ ft.
Maximum Horsepower	109	93	100	93	100
Total Spring Length (Front and Rear "Cushioned Ride") †	194 in.	171⅝ in.	162 in.	176 in.	182 in.
Cab Seat Width (Measure of Roominess) ‡	57¼ in.	52¼ in.	51½ in.	47½ in.	52¼ in.
Windshield Glass Area ▲	901 sq. in.	713 sq. in.	638 sq. in.	545 sq. in.	713 sq. in.
Vent Wings plus Rear Quarter Windows	Yes	No	No	No	No

* To outside of tire (curb clearance.) Computed from data based on tests or computations obtained from usually reliable sources. † All four springs. ‡ Measured from production models. ▲ Computed from width and depth measurements; no allowance for contours.

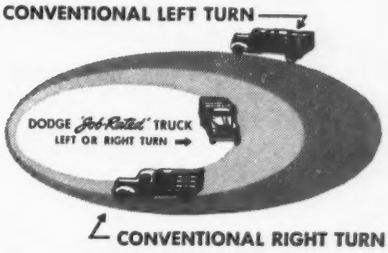
Better Weight Distribution Easier Handling Shorter Turning Diameters



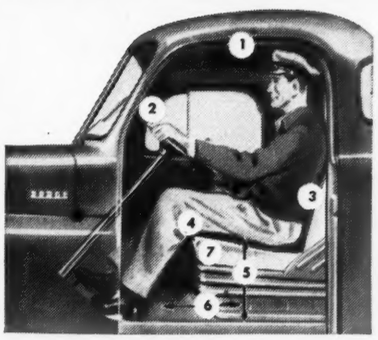
Front axles have been moved back, engines forward, placing more load on the front axle. While cab-to-axle dimensions are the same, wheelbases are shorter, giving better weight distribution, and increased payload.

This new weight distribution, combined with longer springs, produces a marvelous new "cushioned-ride."

You get still more comfort from new "Air-O-Ride" seats, with their easily controllable "cushion of air."



You can turn in much smaller circles, both right and left—you can back up to loading platforms or maneuver in crowded areas with greater ease—because of new type "cross-steering," shorter wheelbases, and wide tread front axles. In all, 248 different *"Job-Rated"* chassis and body models. Up to 23,000 lbs. G.V.W. Up to 40,000 lbs. G.T.W.



1—PLENTY OF HEADROOM.

2—STEERING WHEEL . . . right in the driver's lap.

3—NATURAL BACK SUPPORT . . . adjustable for maximum comfort.

4—PROPER LEG SUPPORT . . . under the knees where you need it.

5—CHAIR-HEIGHT SEATS . . . just like you have at home.

6—7-INCH SEAT ADJUSTMENT . . . with safe, convenient hand control.

7—"AIR-O-RIDE" CUSHIONS . . . adjustable to weight of driver and road conditions.

Round corner construction in Blickman stainless steel processing equipment lowers cleaning time—reduces maintenance costs.

when you buy STAINLESS STEEL PROCESSING EQUIPMENT get maximum saving in cleaning time

Faster cleaning for your stainless steel vessel means this: you reduce maintenance costs and increase the time your equipment can be kept in productive operation. *Round corner construction* will help you achieve this objective.

Even the best brushes require extra time to clear accumulations gathered in a vessel with square corners. When gummy substances or materials that harden are used, it may be almost impossible to clean them from square corners.

S. Blickman, Inc. has developed the technique of round corner construction to a high degree — providing you with equipment that will clean more quickly — at lower cost.

To get *all* the advantages of stainless steel equipment, consult with us.

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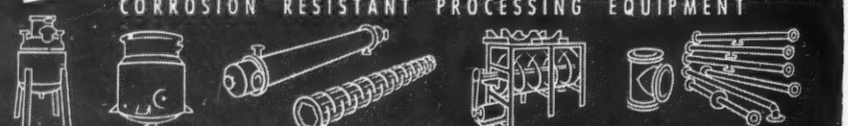
SEND FOR THIS VALUABLE BOOK

A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

CORROSION RESISTANT PROCESSING EQUIPMENT

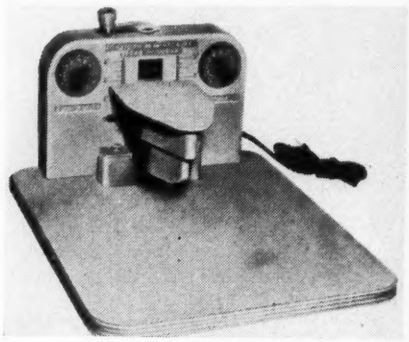


TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

1, Phillipsburg, Pa. The kit includes the new electric impact tool—with standard accessories for nut-running and nut-removal, for drilling steel, masonry or wood, reaming, wire brushing for carbon-cleaning jobs, and equipment for applying and removing studs, tapping, driving and removing screws.

Portable Hot-Sealer

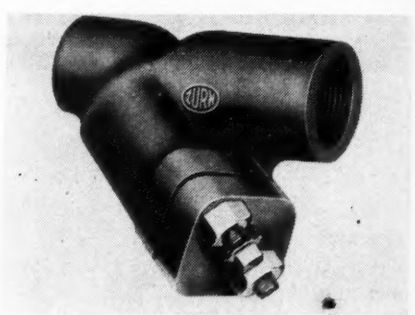
A PORTABLE device for heat-sealing packages hand-wrapped in Cellophane has been developed by Chas. F. Hubbs & Co., Dept. I, New York City, designed to increase hand-wrapping speeds up to double and more on flats, rounds, tapers,



rectangles, cylinders and many odd-shaped packages ranging from 1/16 to 3 in. and over in thickness. Known as "Speed-Wrap" the portable hot-sealer is a bench model measuring 16 in. x 21 in., and operates on 110-125 v a.c.-d.c.

High Pressure Strainer

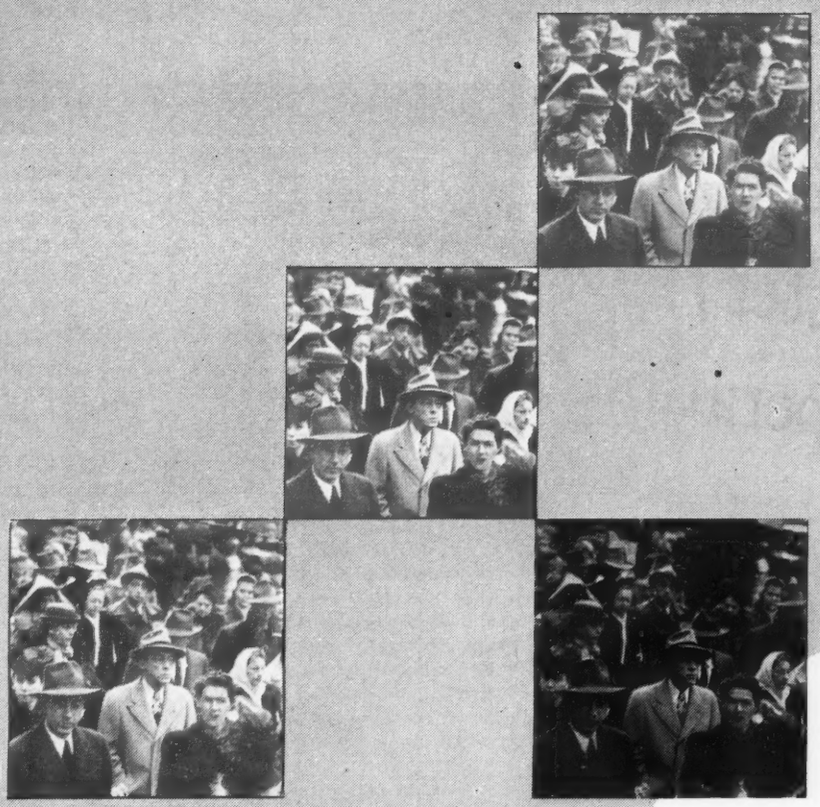
A HIGH-PRESSURE Y-type strainer for pressures up to 600 lbs. has been added to the line of "Y" strainers manufactured by the J. A. Zurn Mfg. Co., Dept. I, Erie, Pa. The strainer is made with threaded, flanged or welded connections in many standard sizes or to specifica-



tion. Its design reduces pressure drop through the strainer to a minimum. The unit is provided with a bolted blow-off connection for blow-down cleaning. Available with a magnetized strainer plug for intercepting small ferrous particles.

Fluorescent Fixture

THE restyled HF-100 industrial fluorescent fixture announced by Sylvania Electric Products Inc., Dept. I, Ipswich, Mass., introduces the major "weatherized" improvements on the company's complete line of industrial lighting fix-



Ac'cent®

PURE VEGETABLE GLUTAMATE

The flavorful goodness of your foods brings them back AGAIN & AGAIN

It's an exciting and satisfying achievement to know that your quality foods reach the consumer with the natural, delicious flavors in all their full-bodied goodness. Profitable, too! For it is flavor and appetizing taste which bring the consumer back to the retail store again and again.

Skillful cooks know how essential to cooking artistry are the distinctive, savory flavors of fine foods. That's why *Ac'cent* is so extensively used in many distinguished restaurants. Why so many processors of quality foods now find it indispensable. *Why it will add prestige and sales appeal to your products.*

Try *Ac'cent*. Our Technical Service Staff will supply samples and advise on its use in intensifying the flavors of your foods. *Ac'cent* is a wholesome protein food product, 99+% pure. It is supplied in 200-lb. drums and is now readily available to meet your expanding requirements.

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INTERNATIONAL MINERALS & CHEMICAL CORPORATION
GENERAL OFFICES: 20 NORTH WACKER DRIVE, CHICAGO 6

From Peanuts to Peanut Butter in ONE Operation!

New 1948 Model SB-1403
70 in. high, 21 in. wide

MOREHOUSE
SPEEDLINE

Peanut Butter Mill

Gives You 4 Great Advantages

1. In one pass - depending upon type desired - either a stabilized or unstabilized product.
2. Constant and uniform grind.
3. Does not require other costly processing equipment.
4. Eliminates all other handling.

1200 to 1800 pounds per hour

Complete processing in one unit — no accessories needed. High-capacity, uniform production — 1200 to 1800 pounds of finely ground peanut butter per hour. High-quality production — adjustable without stopping. Only Morehouse Speedline gives you all these advantages.

Based on the famous Morehouse principle that has multiplied production in many industries and fully proven in use, it is ready for you now. It's compact and portable — dependable and economical in operation — low in first cost.

These are some of the reasons why you can increase both volume and profits with a Morehouse Speedline. Plan now to use the Speedline in your operation. Write today for complete details.

Get MORE with MOREHOUSE

MOREHOUSE
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MOREHOUSE INDUSTRIES
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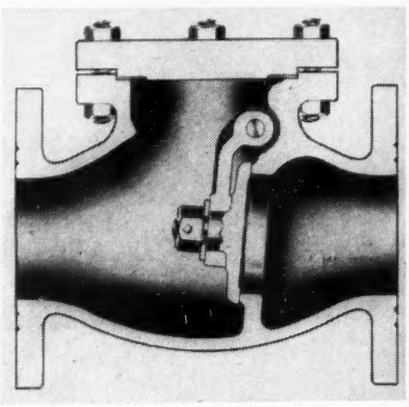
1156-C San Fernando Road Los Angeles 31, California

tures. A weatherized finish on the reflector protects the metal fixture parts from rust, corrosion and pitting under damp and deteriorating atmosphere conditions, as well as providing a reflection factor of 86 percent. The turned-down reflector lip minimizes collection points for dust, lint and moisture and is easily wiped clean.

Swing Check Valves

NEW lines of corrosion-resistant swing-check valves in sizes ½ to 6 in. have been introduced by the Crane Co., Dept. I, Chicago, Ill.

These valves, made in both 18-8 Mo alloy steel and Monel metal, are available in sizes ½ to 2 in. with screwed or

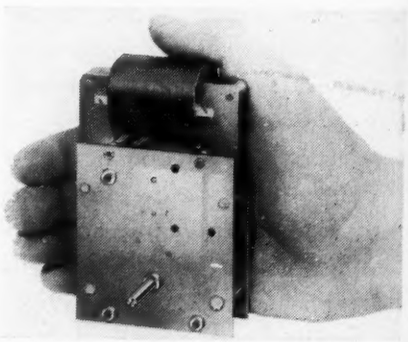


flanged ends, and in sizes 2½, 3, 4 and 6 in. with flanged ends only.

They are designed for the moderate pressures and temperatures usually encountered in piping corrosive fluids. The valves are recommended for liquid or gas working pressures up to 150 lbs. and for a maximum temperature of 350 deg. F.

Fractional HP Motor

A FRACTIONAL horsepower motor with high torque capacity has been marketed by the T. C. Smith Mfg. Co., Dept. I, Springfield, Ill. The motor is the shaded pole, induction type. With 20 watts in-



put at 115 volt, 60 cycle A.C., the no load speed is 20 rpm. on the output shaft. It is constructed of aluminum and has a built-in gear train. Various gear ratios can be supplied.

Automatic Box Maker

A FULLY automatic apple and pear box maker, now undergoing final tests is an-

Spraying Systems SPRAY NOZZLES consistently provide accuracy of spray that means better operation and lower cost for you. Whatever you specify in terms of pressure, volume, spray pattern, distribution, impact, and atomization can be duplicated accurately with a Spraying Systems Spray Nozzle. Write for the facts . . . ask for Catalog 22, a reference manual that lists spray characteristics for thousands of spray nozzle types and sizes.

SPRAYING SYSTEMS CO.

Engineers and Manufacturers

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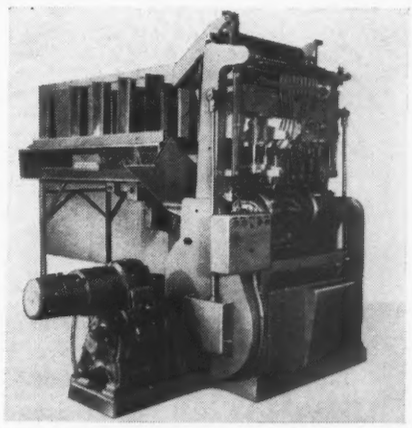
WRITE FOR CATALOG 22

CYCLONE
Metal Conveyor Belts . . .
designed to fit your needs
Cyclone Metal Belts are made in three styles *Chain Link* (left), *Flat Wire* (right) and *Flex-Grid*. There's *one* Cyclone Belt that will fit *your* operating conditions best.
Cyclone offices are located in principal cities. There's always a Cyclone technician close at hand to consult on conveyor belt problems.
WRITE FOR FREE CATALOG No. 4
By the makers of Cyclone Fence
CYCLONE FENCE DIVISION
(AMERICAN STEEL & WIRE COMPANY)
Dept. H-58, Waukegan, Illinois
United States Steel Export Company, New York
CYCLONE FENCE DIVISION • American Steel & Wire Co.
USS
CYCLONE
"Redtop"
CONVEYOR BELTS
UNITED STATES STEEL
UNITED STATES STEEL

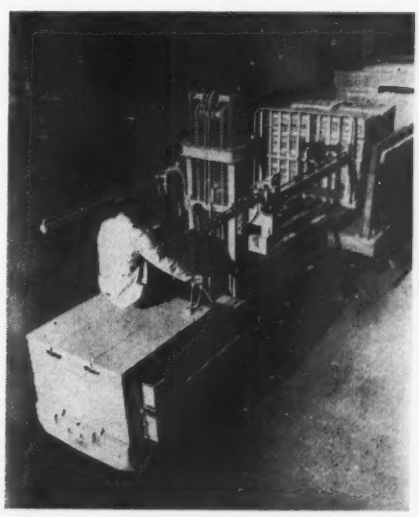
nounced by Food Machinery Corp., Dept. I, Riverside, Calif. This new machine will enable two men to build nearly 500 apple or pear boxes per hr. The senior automatic apple and pear box maker, or



Model XAPS, as the new machine is called, puts together the ends, sides and bottom of the box. A separate lidding machine is used to nail unitized lids on filled containers.

Truck Pusher Device

SIMPLIFIED design, more efficient hydraulic operation and rugged construction with considerable decrease of weight are features of the improved pusher device for use on Clark fork trucks, announced by the Tructractor Div. of



Clark Equipment Co., Dept. I, Battle Creek, Mich. Standard and maximum forward travel of the pusher rack is 55½ in. This may be reduced by 1-in. increments to meet special needs.

Three Position Valve

A NEW, 3-way, neutral position hand operated valve, the 1291-N3, is announced by C. B. Hunt & Son, Inc., Dept. I, Salem, Ohio. The valves are designed for use with single acting air cylinders and are recommended for use with hoists or other applications when it is desired to raise, lower, and hold the load in an intermediate position. Furnished in ⅜ in. and ½ in. pipe sizes for air pressures up to 250 psi.

ARREST BACTERIA!

It's Guilty of Spoilage!

HANOVIA'S POWERFUL LETHERAY

. . . The New Ultraviolet Germicidal Lamp—kills airborne bacteria—it also destroys mold spores that contaminate all types of perishable foods.

LETHERAY is a big food-and-money saver to every merchant who sells meat, fish, poultry, vegetables, fruits, etc.

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NEWARK 5, N. J.

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Four Modern Fortresses For Guarding The Nation's Foods

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WRITE FOR DETAILS

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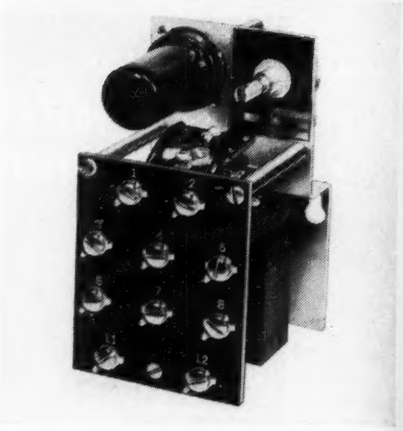
ZONE 6

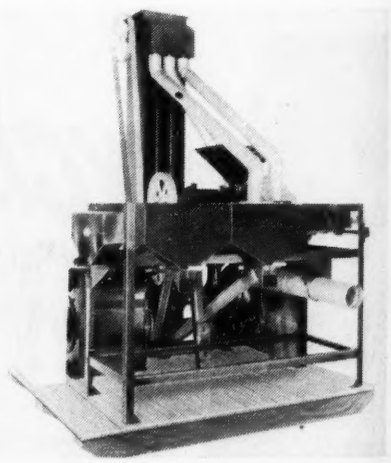


Electronic Relay

THE Leveltronic Relay for industrial applications where pressure, liquid and temperature controls are required is announced by R-S Prods. Corp., Dept. I, Philadelphia, Pa. The applications of the new control, which is rugged and easily operated, include liquid level and interface control and alarm, pressure and flow control and alarm, temperature control and alarm, high foam control and alarm.

Complete Rice Mill

A SMALL, complete rice mill is announced by Engelberg Huller Co., Inc., Dept. I, Syracuse, N. Y. The compact "unit" mill, with capacity of 650 to 750 lbs. of clean white rice per hr., is entirely auto-



matic in operation, takes in rough rice through a hopper in the triple elevator, moves it through the cleaning, shelling, hulling and polishing operations; then grades the finished product as head, broken, and brewers rice.

Ceiling Cooling Unit

A FLAT cooling unit, known as the "Hytsaver," which takes up little space in the top of the refrigerating room is announced by Tenney Engineering, Inc., Dept. I, Newark 6, N. J. The unit is made for suspending from the ceiling of the room, and is provided with slotted hangers for easy installation. In size, it ranges from 24 in. x 24½ in. to 46 in. x 36½ in. in width and length respectively, with all sizes having one height—9¼ in.

MISSISSIPPI RIVER MUD is this valve's regular diet

Raw, silt-laden Mississippi River water at 175 p.s.i. had quickly destroyed conventional type valves through abrasive action and corrosion of exposed working parts in Union Electric Company's Venice, Illinois Plant. Then, their own engineers and Stone & Webster Engineering Corporation selected Grinnell-Saunders Diaphragm Valves. These flanged, unlined valves with rubber diaphragms have already served several times longer than previous valves, and are still going strong.

YOU, too, may find your answer to valve troubles due to corrosion, contamination or suspended solids, in

GRINNELL-SAUNDERS DIAPHRAGM VALVES

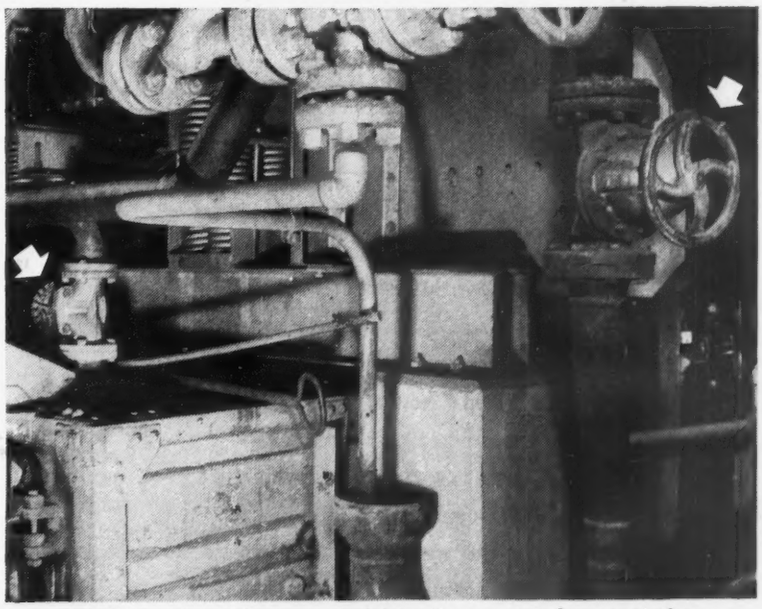
ISOLATED WORKING PARTS — The flexible diaphragm isolates working parts of the valve from the fluid, preventing contamination or corrosion.

CORROSION-PROOF LININGS — A selection of diaphragm materials and also body linings of glass, porcelain, lead, rubber or synthetics to suit your service requirements.

STREAMLINED FLOW . . . POSITIVE CLOSURE — Streamlined passage without pockets minimizes friction. Large area of contact of the diaphragm, plus diaphragm resilience, permit positive closure even when solids are trapped.

Write for catalog—Grinnell-Saunders Diaphragm Valves.

GRINNELL COMPANY, INC.
Providence 1, R. I.



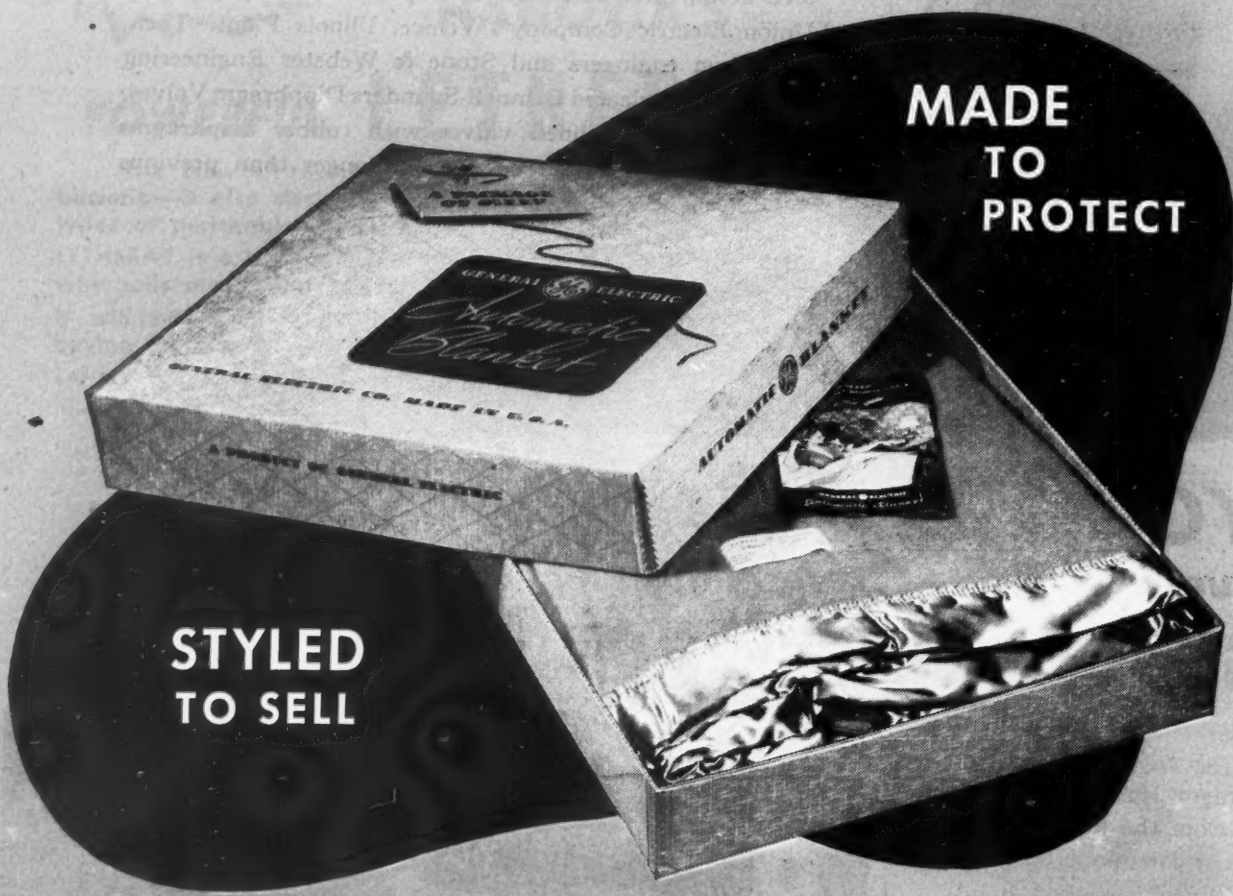
Grinnell-Saunders Valves on ash sluicing lines in central power station.

BRANCH WAREHOUSES

Atlanta 2, Ga.	Kansas City 16, Mo.	Philadelphia 34, Pa.
Charlotte 1, N. C.	Long Beach 10, Cal.	Sacramento 14, Cal.
Chicago 9, Ill.	Los Angeles 13, Cal.	St. Louis 10, Mo.
Cleveland 14, O.	Milwaukee 3, Wis.	St. Paul, Minn.
Cranston 7, R. I.	Minneapolis 15, Minn.	San Francisco 7, Cal.
Fresno 1, Cal.	New York 17, N. Y.	Seattle 1, Wash.
Houston 1, Tex.	Oakland 7, Cal.	Spokane, Wash.

GRINNELL
WHENEVER PIPING IS INVOLVED

H&D BOXES



This corrugated package will deliver its contents from the manufacturer to consumer without repacking in perfect condition and will be attractively displayed at point of sale. In the home, it will provide clean, durable storage for many years to come. Here is a typical example of how an H & D box can make a good product *better*. Consult the Hinde & Dauch Package Laboratory on ALL packaging problems.

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CATALOGS, BULLETINS

HOW TO GET THIS LITERATURE

This digest of manufacturers' new publications is offered by Food Industries Reader Service as a convenience for executives. The editors feature catalogs, data sheets and technical pamphlets likely to interest purchasing agents, superintendents, packaging men and food technologists. A request to Reader Service for copies of these catalogs will be passed on to the manufacturers. Coupon cards, ordinarily included in each issue for this purpose, will be supplied again when the emergency ends in the printing industry. Send your memo or letter to Reader Service, Food Industries, 330 West 42nd St., New York 18, N. Y.

Food Plant Equipment

Heat Sealer
Wrapade Machine Co., Inc.—4-page bulletin describing and illustrating semi-automatic and automatic heat sealing crimpers made by this company.

Steam Traps
W. H. Nicholson & Co.—12-page bulletin No. 1007 features steam traps, equipped with bronze, monel, or stainless bellows and bronze, cast iron and cast steel bodies—sizes ¼ to 2 in. for all pressures from vacuum to 300 lb.

Backstop
The Falk Corp.—4-page bulletin No. 10080 describes and illustrates backstop, a positive method for preventing a reverse rotation on conveyor drives, elevator head shafts, windlasses and winches.

Packaging Machinery
Paul L. Karstrom Co.—4-page manual on "Spee-Dee" packaging machines that operate at speeds from 12 to 72 fillings per min. giving exact weights from a few grains to 5 lb.

Wrapping Machine
Knapp Mfg. Co.—4-page manual describing and illustrating high-speed semi-automatic and automatic wrapping machines made by this company.

Heat Transfer
Marlo Coil Co.—12-page booklet describes and illustrates unit coolers, evaporative condensers, air conditioning units, cooling towers.

Process Compressers
Ingersoll-Rand Co.—7-page booklet shows the complete line of basic types of I-R compressors and blowers from ½ to 30,000 hp. sizes.

Diaphragm Pumps
T. Shriver & Co., Inc.—8-page bulletin No. 126 illustrating and describing Shriver diaphragm pumps.

Dry Type Transformers
Walker Electric Corp.—20-page booklet "TU-56" unit specification dry-type transformer, illustrates and deseribes various parts of equipment.

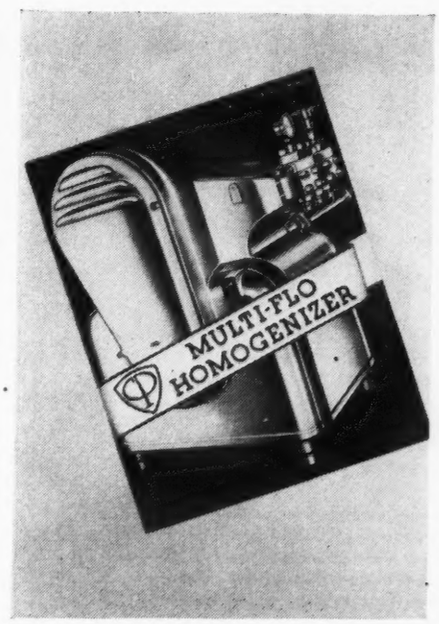
Wire Products
Pacific Wire Works Co.—4-page folder "Handling Necessities for Food" describes and illustrates wire trays, baskets, wire cloth, and woven-wire conveyor belts.

Root Vegetable Line
Allen Iron & Welding Corp.—6-page folder describing and illustrating equipment used in processing beets, salads, potatoes.

Fire Pump
Peerless Pump Div., Food Machinery Corp.—9-page bulletin No. B-162, illustrating and describing important features of the vertical turbine fire pump and its applications.

Stainless Steel
Globe Steel Tube Co.—Bulletin No. 301 contains chart showing the chemical analyses of most of the stainless steels produced and usually available by the many steel mills.

Homogenizer
The Creamery Package Mfg. Co.—6-page bulletin N-12. Describes and illustrates various models



of multi-flo homogenizers—lists capacities, power requirements and dimensions.

Packaging Equipment
American Machine & Foundry Co.—4-page pamphlet describes highspeed fold-wrap twisting machine, interchangeable in two ways—piece sizes and or to fold or twist wrap.

Gear Reducer
Ohio Gear Co.—120-page Stock Gear and Reducer catalog. It is divided into sections on reducers, gears, chain and sprockets. Includes engineering data, ratings, ratios, formulas, tables and cost.

Water Conditioning
Cochrane Corp.—12-page booklet 4425 "Cochrane Rapid Reactors" describes new method of conditioning process cooling waters and boiler feeds.

Air Recovery Handbook
W. B. Conner Eng. Corp.—16-page bulletin No. 105-A—an engineering and application data book on their type "H" Vorex air recovery equipment.

Heat Transfer
Bush Mfg. Co.—10 page pocketsize booklet containing data on heat transfer for cooling and storage.

Corn Chip Machine
A-M Machy. Co.—20-page loose-leaf catalog describing and illustrating this company's complete line of corn chip machinery.

Filters—Mixers
Alsop Engineering Corp.—23-page booklet describes and illustrates disc filters, various types of mixers and glass-lined tanks.

Combination Starter
Electric Machinery Mfg. Co.—8-page booklet No. 192 showing construction, operation and application of "Hi Fuse" combination starter for high-voltage, induction and synchronous motors.

Refrigeration Equipment
Kramer-Trenton Co.—32-page catalog No. R-125—describes and illustrates various refrigeration equipment, made by this company.

Materials Handling

Belt Conveyors
Rapids-Standard Co., Inc.—Single-page, two-side information bulletin showing illustrations and specifications of the newly announced Floor-veyor Jr. and Stevedore Jr. power belt conveyors.

Handling Devices
Clark Equipment Co.—Colorful 40-page catalog presenting its full line of machines and special handling attachments. Prominently featured are the Clark "Pul-Pac" and the Clark "Hi-Lo-Stack."

Fork and Lift Trucks
Mercury Mfg. Co.—52-page catalog No. 7-11 illustrating and describing all Mercury equipment and features, including the newest additions to their extended materials handling line.

Electric Hand Trucks
Yale & Towne Mfg. Co.—3-color, 30-page bulletin No. P809 on their complete line of Worksaver electric trucks.

Pallets
Monroe Auto Equipment Co.—12-page standardized material handling equipment catalog. Describes, with illustrations, pallets, boxes, platforms, skids, nestling rings and accessories to increase utility of handling equipment.

Belt Conveyors
Island Equipment Corp.—12-page bulletin "Alternate Stationary Medium-Duty Horizontal and Inclined Conveyors"—illustrated with cuts of various types of equipment, diagrams, tables and cross-sections.

New Belt Conveyor
Island Equipment Corp.—Bulletin IP-1 on the "Island Unitized Conveyor Table" that can be used as a work table for assembling, inspecting and conveying.

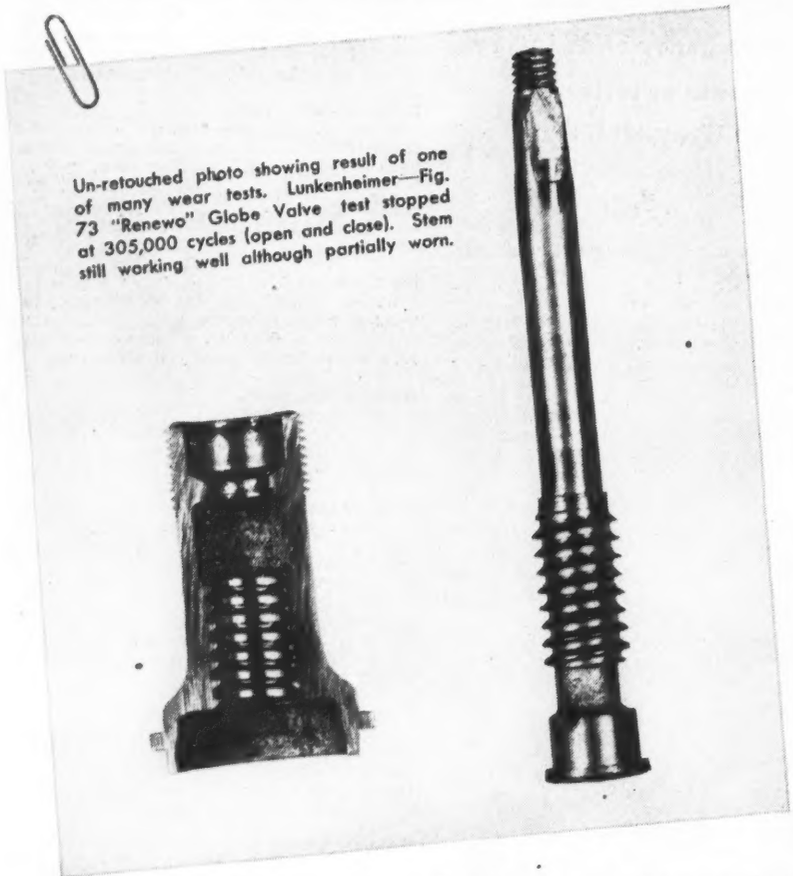
Electric Hoists
Robbins & Meyers, Inc.—24-page, 2-color bulletin 830, "Hoists for the Food Industry." Contains many application photographs, line drawings and rating tables.

Electric Fork Trucks
The Yale & Towne Mfg. Co.—8-page, 2-color bulletin, 2308, giving complete engineering specifications, capacity charts, cutaway photographs of motivating and lifting mechanism on their 1,000-lb. electric tilting-fork trucks. Also bulletin 2316 containing similar information on their 1,500-lb. truck and bulletin 2309 on the 2,000-lb. truck.

Industrial Trucks
Clark Equipment Co.—20-page booklet illustrated with action pictures on processing operations in various food industries. Also illustrated are a number of hand-truck attachments.

PROVED
...in actual service

MILLIONS OF LUNKENHEIMER VALVES IN SERVICE
. . . without a single report of stem-thread failure



Un-retouched photo showing result of one of many wear tests. Lunkenheimer—Fig. 73 "Renewo" Globe Valve test stopped at 305,000 cycles (open and close). Stem still working well although partially worn.

Fig. 73 "Renewo" Globe Valve. All Lunkenheimer bronze stems, from the smallest to the largest, are made of patented wear-resistant alloy.

- For many years, stem-thread wear was a major source of valve failures. Corrosion and especially dezincification, also frequently caused failures. With traditional resourcefulness, LUNKENHEIMER research developed two new stem alloys (Symbols RSB and Alloy 6) which completely revolutionized all prior conceptions of stem serviceability (patent granted).
- Before submitting this revolutionary development to the trade, laboratory tests of valves under severe operating conditions were conducted with these and many other possible materials. In every test, LUNKENHEIMER alloy stems outlasted others by wide margins.
- Today, out of millions of LUNKENHEIMER Valves equipped with these exclusive alloy stems, not one has been returned because of stem-thread failures. Servicaebility in other respects has had comparable improvement.
- What does this mean to you, as a valve user? By eliminating one cause of valve trouble, LUNKENHEIMER assures you far greater service life with even less maintenance cost.
- Your LUNKENHEIMER Distributor will gladly explain in detail the many advantages of this patented and exclusive stem material. Ask him about LUNKENHEIMER Alloy Bronze Valve Stems.

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"QUALITY"
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NEW YORK 13 CHICAGO 6 BOSTON 10 PHILADELPHIA 34 EXPORT DEPT. 318-322 HUDSON ST., NEW YORK 13, N. Y.

Control Equipment

Tachoscope
O. Zernickow Co.—4-page pamphlet describes and illustrates direct reading, chronometric tachometer.

Electric Contact Controller
Taylor Instrument Cos.—2-page bulletin No. 98098 graphically describing new electric contact controller for on-off application involving temperature, pressure, flow, liquid level or humidity, such as ovens, dryers, heaters, vats, cookers and tanks.

Control Valve
Alco Valve Co.—20-page catalog No. 19, lists complete data on control valves for various refrigerants.

Refrigeration Instruments
Jas. T. Marsh Corp.—23-page pocket booklet describes and illustrates various gages and thermometers for refrigeration equipment.

Electronic Timer
Photoswitch, Inc.—Bulletin No. P-478 describes an electronic timer designed for machinery and process control— range from .03 sec. to 4 min.

Electric Micrometer
Stevens-Arnold, Inc.—Catalog 227 contains full information on a new electric micrometer for measuring, gaging, comparison and telemetering.

Air Velocity Meter
Hastings Instrument Co.—4-page leaflet illustrating and describing a meter for measuring air velocity.

Water Level Control
Northern Equipment Co.—Buelltin 475, a case study of boiler water level control in an industrial plant.

Moisture Indicator
McIntire Connector Co.—4-page catalog M-1 illustrates and describes moisture indicators used to determine moisture in a refrigeration system.

Tachometer
The Metron Instrument Co.—Single page bulletin No. 101 describing a precision tachometer for close speed measurements in the laboratory.

Speed Changers
The Metron Instrument Co.—4-page bulletin No. 100 describing miniature speed changers for instruments, controls, regulators, or any small power devices.

Electronic Control Unit
R-S Products Corp.—6-page detailed catalog No. 27 on their electronic relay, designed for basic applications in the control of liquid levels, pressures and temperatures.

Plant Supplies

Aluminum Paint
Aluminum Industries, Inc.—24-page manual telling how to use aluminum paints for brighter and cooler interiors, on heated surfaces, roofs equipment or products.

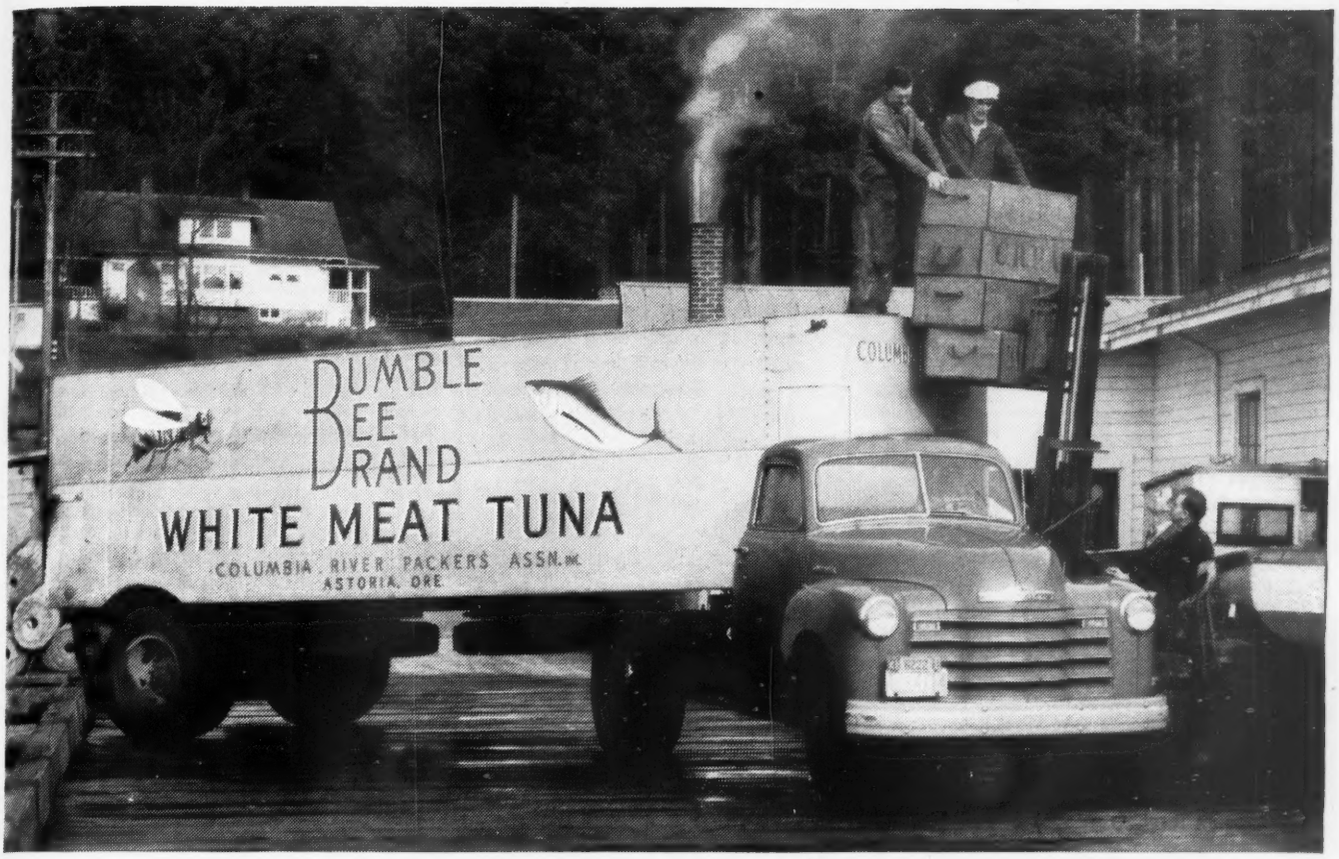
Stainless Steel Piping
Tube Turns, Inc.—New booklet "Stainless Steel Piping—Why and Where to Use It." Contains numerous tables and illustrations.

Metal Marking Tags
The Metal Marker Mfg. Co.—3-page folder illustrating metal marking tags for use in marking, identification and shipping purposes.

Decals
Palm Bros. Decalcomania Co.—10 page booklet illustrated with samples of a variety of industrial decal applications, from tiny name plates to large truck panels.

Silicone Rubber
Dow-Corning Corp.—"Silastic Facts No. 5."—a 16-page book, uses and characteristics of Silastic as a gasketing and electrical insulating material.

Hygrometer Equipment
American Instrument Co., Inc.—28-page bulletin No. 2164 describing a complete line of electric hygrometer equipment suitable for the more exacting industrial and laboratory applications. Contains selection charts, diagrams and calibration curves.



You Can Count On

NEW ADVANCE-DESIGN CHEVROLET TRUCKS

For More Value — In More Ways — On Your Job

Business leaders everywhere recognize the new high value of these latest and greatest Advance-Design trucks! You'll agree, too—once you see and once you try these trucks that represent the supreme achievement of advanced engineering. And they're the lowest-priced trucks in the volume field! Model for model, and with comparable equipment and specifications, they *list for less than competitive makes*—some models *as much as $150.* See them at your dealer's now.

CHEVROLET MOTOR DIVISION, *General Motors Corporation,*
DETROIT 2, MICHIGAN

CHOOSE CHEVROLET TRUCKS FOR TRANSPORTATION UNLIMITED

Only Chevrolet Advance-Design Trucks for 1948 Have All These New and Finer Features

NEW CHEVROLET 4-SPEED SYNCHRO-MESH TRUCK TRANSMISSION

A special feature in heavy-duty models that assures new operating ease and efficiency.

NEW ADVANCE-DESIGN GEARSHIFT CONTROL

A steering column gearshift in models with 3-speed transmissions provides greater driving ease and convenience.

NEW FOOT-OPERATED PARKING BRAKE

A feature that offers new clear floor area, safety and efficiency in models with 3-speed transmissions.

NEW IMPROVED VALVE-IN-HEAD ENGINE

The world's most economical engine for its size now has greater durability and operating efficiency.

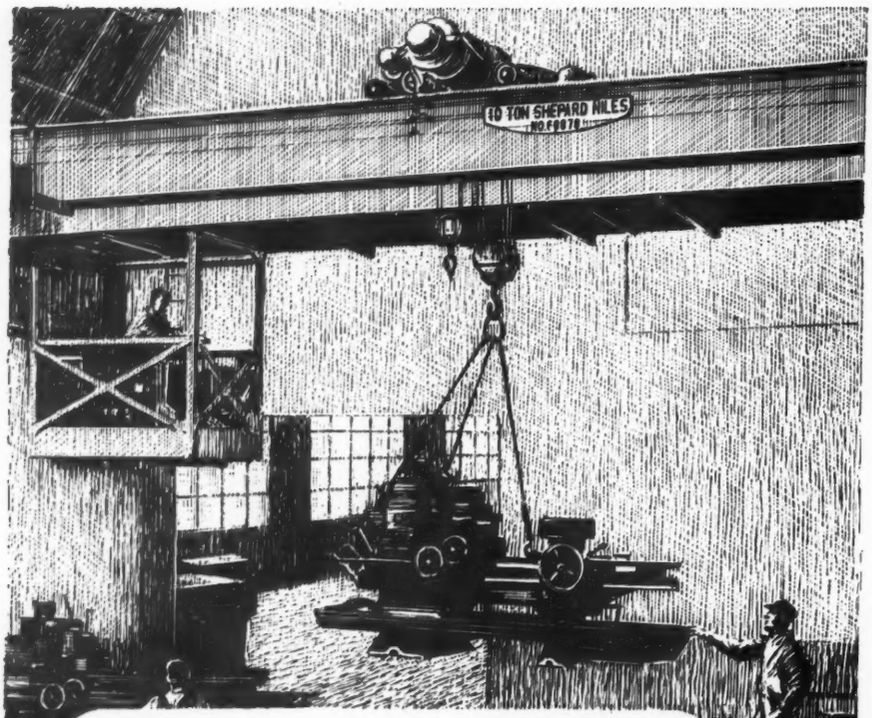
SPLINED REAR-AXLE SHAFT ATTACHMENT TO WHEEL HUBS

Greater strength and durability in heavy-duty models with this exclusive Advance-Design feature.

PLUS The Cab that "Breathes"* • Uniweld, all-steel cab construction • New, heavier springs • Full-floating hypoid rear axles on ¾-ton and Heavy Duty models • Specially designed brakes and Hydrovac Power brakes on Heavy Duty models • Ball-bearing steering • Double-line pre-selective power shift in 2-speed axle at extra cost • Wide base wheels • Standard cab-to-axle-length dimensions • Multiple color options.

**Fresh air heating and ventilating system optional at extra cost.*

CHEVROLET



Pick up, Move, Put down, Repeat

When an electric overhead traveling crane will pick up, move, put down heavy loads over and over again — and do it all economically, smoothly, safely — year after year, that's sweet music in the ears of plant engineers and cost accountants.

Ordering an overhead traveling crane that will handle your lifting and moving work involves more than just specifying top capacity. With a Shepard Niles overhead traveling crane you get the capacity you need, sound design, rugged and precise construction and reserve strength — as well as assurance of trouble-free operation. But you get much more. You get an overhead traveling crane designed and built to handle your own particular job.

Trained, experienced Shepard Niles engineers have data on thousands of crane installations, in every type of industry. All this information and experience is available to you without obligation. Let a Shepard Niles engineer help you select the crane best suited to you, out of the many sizes and types available.

★ We are unbiased in our recommendations. If a survey of your material handling shows you need an electric hoist instead of an overhead traveling crane, Shepard Niles will recommend a hoist. America's pioneer builder makes both electric overhead traveling cranes and electric hoists for every need.

Shepard Niles
CRANE & HOIST CORPORATION

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Waterproof Bags
Bemis Bros. Bag Co.—12-page booklet describing the jobs that can be done with waterproof laminated textile bags.

Batch Cleaning
Oakite Products, Inc.—Illustrated service reports on how a specially engineered batch-cleaning method makes possible the cleaning and derusting of as many as 500 beef, sheep and hog trolleys per hour.

Linerless Cartons
Marathon Corp.—20-page booklet on Marathon's new linerless ice cream cartons—illustrates and describes features of carton.

Glue, Paste and Gum
National Adhesives—20-page booklet "How to Use and Prepare Glue, Paste and Gum," contains helpful information on the storage and handling of all types of adhesives.

Washroom Service
The West Disinfecting Co.—12-page illustrated brochure, entitled "An Ideal Washroom Maintenance Service." This plan entitles the user to a unique maintenance service.

Water Cooler
Drinking Water Cooler Mfrs. Assn.—28-page booklet describes and illustrates general types of coolers. Gives factual advice on type and number for various plants and offices.

Miscellaneous

Lighting Guide
Sylvania Electric Products, Inc.—24-page manual describes controlled and correctly proportioned light levels in five lighting areas—the ceiling, at the fixture, on vertical backgrounds, merchandise and floor.

Lithium Hypochlorite
The Solvay Process Div., Allied Chemical & Dye Corp.—28-page report on lithium hypochlorite gives accurate data on chemical and physical properties.

Cartridge Dryer
Mueller Brass Co.—4-page folder describing and illustrating a cartridge refill type drier using silica gel as drying agent.

Flavor Catalog
Dodge & Olcott, Inc.—10-page catalog listing the essential oils, vanilla, flavor bases, balsams, gums and oleo resins made by this company. Contains prices.

Magnetic Separator
Dings Magnetic Separator Co.—4-page bulletin No. 1120 which describes operation of its laboratory in solving separation problems in many industries.

Cement Floor Material
The Upco Co.—8-page illustrated booklet on "Hydroment" contains practical data on floor maintenance, new concrete construction and tile-joining.

Plant Cleaning Guide
Oakite Products Inc.—4-page illustrated service report providing helpful data on equipment cleaning and sanitizing procedures used in chocolate and candy specialty manufacturing plants.

Coal Cleaning Systems
McNally Pittsburg Mfg. Corp.—20-page bulletin 216 containing information on 4 coal cleaning systems with explanatory circuits, illustrations of machines, and diagrams of operation.

Glass Blocks
Pittsburgh Corning Corp.—28-page bulletin illustrating and describing PC glass blocks. Contains technical data, installation details and tables.

Fractional HP Motors
Redmond Co., Inc.—4-page pamphlet, describing and illustrating 1/20 hp. micromotor.

Portable Wire Reel
Industrial Electrical Co.—2-page booklet describing and illustrating a portable electric wire reel and its various uses.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

MEATS

Yellow Fat in Swine

FEEDING flaxseed to hogs may result in an increase in "yellow fat" in pork. These "yellow fat" hogs have occasionally been encountered and condemned in commercial packing plants because of the large amounts of three double-bond unsaturated acids in the carcasses.

Tests were conducted on rats to discover the effect of incorporating linseed oil (45.78 percent linolenic acid) into their diet with ground flaxseed. It was found that the amount of the three double-bond acids was from 24.73—27.59 percent of the fatty acids present, when the oil was only 14.5 percent of the ration. It was found also that the polybromides from both hog and rat fatty acids did not depress the melting point of samples of known hexabromostearic acid prepared from linseed oil. Conclusions were that, contrary to the generally held view, these animals can deposit substantial amounts of trienoic acids in depot fat, the amount depending upon the ration received in their diet.

Digest from "Yellow Fat in Swine," by B. W. Beadle, O. H. M. Wilder, and H. R. Kraybill, presented at the Chicago Section of A. C. S., Chicago, Ill., December 26, 1947.

Discoloration of Sausage

GREENISH DISCOLORATION among various types of cured, comminuted sausage products result from microorganisms not normally present in the sausage kitchen as a contaminant. They gain entrance to the plant in some unknown fashion and build up on equipment that has not been thoroughly cleaned. From these surfaces the microorganisms are planted on the surfaces of the finished product in numbers large enough to cause trouble after a few generations of growth.

An investigation into the cause of green rings in wieners and bologna revealed that the large numbers of microorganisms, found on the surfaces showing the greenish discolorations, all fell into two well-known groups, *Lactobacillus* and *Leuconostoc*. Further study revealed that all lactobacilli are identical in practically all their characteristics and comprise a hitherto unrecognized species. The same would apply to the leuconostoc cultures studied. The lactobacilli are rod-shaped and do not form spores that are heat-resistant. Leuconostocs are streptococcus-like and produce CO_2 upon fermenting sugars. These bacteria grow well at low temperatures, are relatively tolerant to salt and produce H_2O_2 when grown in air.

Digest from "Greenish Discoloration of Sausage," by C. F. Niven, *The National Provisioner*, 17-19, 22-23, March 8, 1948.

DEHYDRATION

Dehydrated Foods

PRODUCTION of stable, non-perishable dehydrated foods, particularly vegetables and meats, with moisture content as high as 25 percent, is the object of a recently patented invention. The process is particularly applicable to vegetables which are substantially non-sugar bearing. The procedure involves impregnating the liquid phase of the vegetable with a preservative constituent, by immersion or spraying. Sugar will act as such preservative, but a combination of sugar with edible salts and organic acids may also be used. These additions protect the liquid phase of the vegetable against deterioration. Cost of dehydration is low because it is not necessary to remove moisture to very low limits. Color and flavor are improved compared with dehydrated products made by customary methods, and the products resist enzymatic changes when air packed.

Digest from U. S. Patent 2,432,222, issued December 9, 1947, on an application dated June 17, 1944, to A. M. Zenzes and W. Schloessinger, New York, N. Y.

Freeze Drying

DRYING of frozen materials, such as citrus juices, milk, eggs and plasma, without deleteriously affecting them, is the object of a recently patented process. In the process, a dry gas is passed along the surface of the frozen material, which is subjected to radiant energy to vaporize the frozen water. Water vapor is entrained in the dry gas. Moisture-laden gas is withdrawn, dried and recirculated.

Digest from U. S. Patent 2,435,503, issued Feb. 3, 1948, on an application dated Sept. 30, 1943, to S. O. Levinson and F. Oppenheimer, Chicago, and assigned to Michael Reese Research Foundation.

VITAMINS

Vitamin A Retention In Margarine

EXPERIMENTAL studies of vitamin A retention in margarine during storage suggest the application of a new and less expensive method of fortifying that would substantially reduce the overdose necessary for a minimum label guarantee. Experiments indicate that vitamin A, in the form of distilled esters, is consistently more stable over a longer period of time and at higher temperatures than in the alcohol-type concentrates in general use.

Laboratory procedures involved the testing of 3 lots of distilled mixed vitamin A esters of varying potency ranges. They were compared with 3 lots of vitamin A alcohol concentrates of the same potency ranges. Margarine was made from both types of concentrates and stored at 40 and 70 deg. F. At both temperatures the ester-type was retained to a higher degree. The alcohol concentrate showed a more rapid and severe loss at 70 than at 40 deg. F. Vitamin retention was studied, by both colorimetric and bio-assay methods according to U.S.P. procedure, in another series and good agreement with the first series was obtained.

Digest from "A Study of Vitamin A Retention in Margarine," by A. I. Coombes, presented at a technical conference of the Chicago Section of American Chemical Society and the Section on Chemistry of American Assoc. for the Advancement of Science, Chicago, Ill., Dec. 26, 1947.

Riboflavin From Milk

SYNTHESIS of vitamins, particularly riboflavin, by fermentation of lacteal material is revealed in the specifications of a recent patent, covering an improvement on an earlier patented process. According to the earlier patent (U. S. 2,369,-680) the natural riboflavin content of whey or skim milk can be increased considerably by subjecting the lactose-containing medium, under controlled conditions, to the fermenting action of *Clostridium acetobutylicum*. The product will have its riboflavin content increased from about 1.4 to from 6 to 70 micrograms per milliliter, corresponding to 240 to 2,800 micrograms per gram on a dried basis. It

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has now been found that this increased yield can be greatly improved by incorporating xylose or xylose-containing material with the whey or other lactose-containing material to be fermented. Wood hydrolysates and by-products of pulp-wood digestion can be used as a source of xylose if iron and other toxic materials are removed. The xylose may be added to the whey preferably before the latter is sterilized, but is effective if added as late as 15 hr. after initiation of fermentation.

Digest from U. S. Patent 2,433,232, issued Dec. 23, 1947, on an application dated Nov. 11, 1944, to R. E. Meade, N. E. Rodgers, and H. L. Pollard, Appleton, Wis., and assigned to Western Condensing Co., San Francisco, Calif.

BAKING

Soy Flour in Pastry

FAT in soy flour exerts a shortening effect upon baked products. Twenty percent soy flour of 4 types (containing 21.55, 12.06, 6.21 and 0.57 percent fat, respectively) was added to the formula of a wheat flour wafer, fortified with added gluten (3 percent) to give a test wafer of higher breaking strength. Using the breaking strength of wafers made with wheat flour only as a standard, significant differences were found for each type of flour. The differences indicated that the use of full-fat and high-fat soy flour increased the shortness of the wafers.

A byproduct of these studies was the development of a method for obtaining photomicrographs of raw dough sections. Raw samples of dough were imbedded in 10 percent gelatin and frozen. Sections 15 microns thick were then cut with a microtome. The sections were stained with Sudan IV, coloring the fat an intense red which photographs black.

Digest from "Effectiveness of Fat in Soy Flour as a Shortening Agent," by R. D. Frantz and J. I. Simpson, *Food Research*, vol, 12. 461-67, Nov.-Dec., 1947.

Staling of Bread

WATER-BINDING capacity of bread crumb increases slightly with the staling of bread. Similarly this capacity increases in the retrogradation of starches and amyloses. This is indicated as a result of tests to determine the relative vapor pressure of water in fresh and stale bread crumb, nonretrograded and retrograded starches and amyloses. The increase in water-binding capacity for bread crumb amounts to about 0.01 g. of

(*Continued on page* 194)

Time and research have proved the nutritional value of

YEAST

A natural food rich in B complex vitamins and in high quality proteins

Discoveries through the years have established yeast as one of the best sources of not one, but many, nutritive factors: proteins—the amino acids usually considered essential for growth and tissue repair and maintenance; the entire B-complex group of vitamins.

A recent report* reviews some of these findings:

"Before the first World War and throughout its duration, the major interest in yeast centered on its protein content. This had been shown to be as high as 40 to 50 per cent and of a highly digestible nature. Shortly before the war, discoveries were made pointing to the presence in yeast of growth-stimulating and disease-preventive and curative substances, later to be designated as accessory food substances or vitamins."

"...Many studies were made of yeast as a carrier of the B-complex groups of vitamins, particularly thiamine, riboflavin, niacin, pantothenic acid, and pyridoxine. Likewise, yeast has been studied as a protein food, rich in the amino acids essential to the proper nutrition of both man and animal. These studies have established yeast as a food material of considerable potential importance."

Constant research is going on, and in time, even more nutritive factors may be found in yeast.

Standard Brands Incorporated has three generations of practical yeast manufacturing experience, supplemented by extensive modern facilities for production and research. It is especially qualified to supply yeast and yeast derivatives to the food trades. Outstanding research and excellent manufacturing give assurance of uniformly high quality in Standard Brands products.

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*"Brewer's Yeast in Human and Livestock Nutrition" by C. C. Prouty, State College of Washington.

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A Progress Report on Phase Microscopy

EVER since American Optical Company developed the first phase microscope to be shown in this country, scientists have awaited the day when it would be readily available.

The equipment revealed detail almost invisible under the ordinary microscope—particularly in unstained and living material. Bacteria, tissue cultures, blood, protozoa, textile fibers, minerals, crystalline substances, plastics and other transparent materials—all could be studied more effectively.

However, much work remained to provide suitable phase objectives for many specific purposes. Sales efforts were postponed in favor of continued development.

After years of research in cooperation with many leading scientists, the wisdom of this policy was demonstrated at the 1947 AAAS Convention in Chicago. Many visitors brought their own materials in which significant detail could be seen only under the Spencer Phase Microscope.

The superior results are largely due to the variety of Spencer phase objectives. For each magnification, there are three different types of objectives—Dark Contrast, Bright Contrast and B Minus Contrast, each in three degrees of contrast. More than 20 in all, they enable the user to select the best equipment for his needs . . . and provide flexibility far greater than equipment giving only one type of contrast.

Production is being geared to keep pace with the increasing demand for Spencer Phase Microscopes. They will soon be available through qualified distributors. Watch for further announcements.

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Manufacturers of the **SPENCER** *Scientific Instruments*

water per gram of dry crumb. The corresponding figure for whole wheat starch is of the order of 0.015 g., for wheat starch amylose 0.025 g., and for potato starch amylose 0.035 g. The structure developed in staling is formed by cross linkages between nonaqueous elements of the bread substance which, nevertheless may involve water molecules.

Three methods of testing were used: (a) The isotenoscope method, measuring the adsorbed water in a sample at a known vapor pressure; (b) equilibration over sulphuric acid solutions of known composition and (c) a modification of the Brunauer and Emmett method for measuring the adsorption of a gas on a solid. The third method was found not completely reliable and the plotted results of the tests were based on data obtained from the first two methods.

Digest from "Studies on Bread Staling. II.—War Relationships During Staling of Bread Crumb. and the Retrogradation of Starch," by H. L. Bachrach and D. R. Briggs, *Cereal Chemistry*, vol. 24, 492-506, November, 1947.

FATS and OILS

Margarine Manufacture

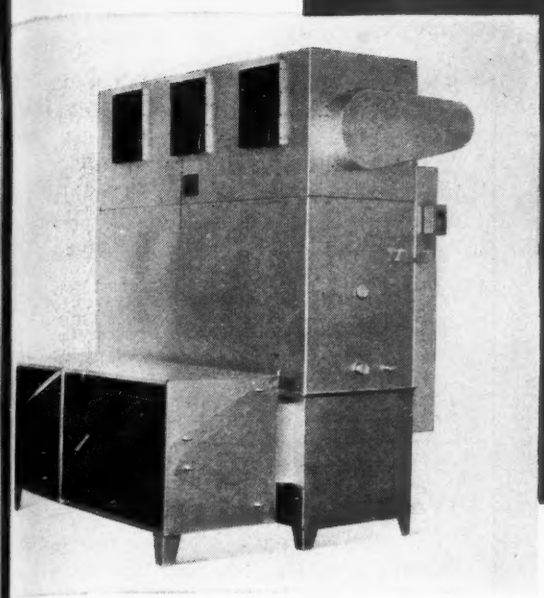
IMPROVEMENTS in the later stages of oleomargarine manufacture as a result of subjecting the hot blend of fat, skim milk and other ingredients to a special treatment are the claims made for a recently patented process. The special treatment consists of cooling the liquid blend from about 95 deg. to between 75 and 85 deg. F. and viscolizing at a pressure differential of from 200-500 psi. before further cooling. The product is then filled into shipping containers while still fluid.

Digest from U. S. Patent 2,434,429, issued Jan. 13, 1948, on an application dated August 8, 1942, to C. E. Nelson, Chicago, and assigned to Kraft Foods Co.

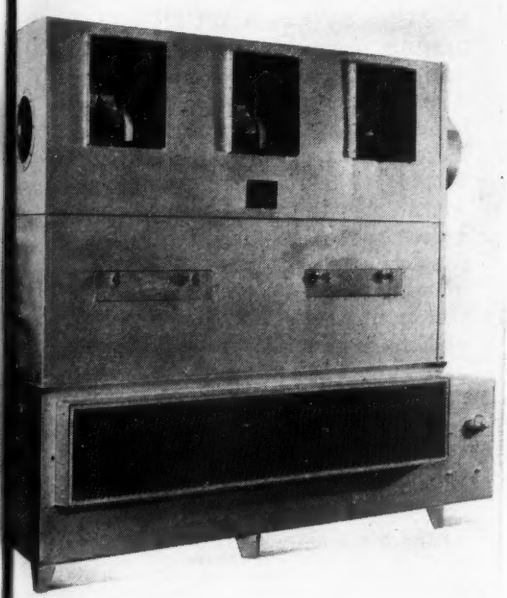
Powdered Shortening

NON-GREASY, free-flowing powdered shortenings, that can be incorporated in prepared baking mixes, are described in a recently granted patent. They are prepared by emulsifying the fats with mixtures of skim milk, whey, buttermilk or soya bean solids and dehydrating on a conventional drum type drier. It is claimed that the protein of the milk or soya bean forms a protective coating around the fat. When dispersed in the dough, the maximum amount of fat is freed and made available for the shortening function.

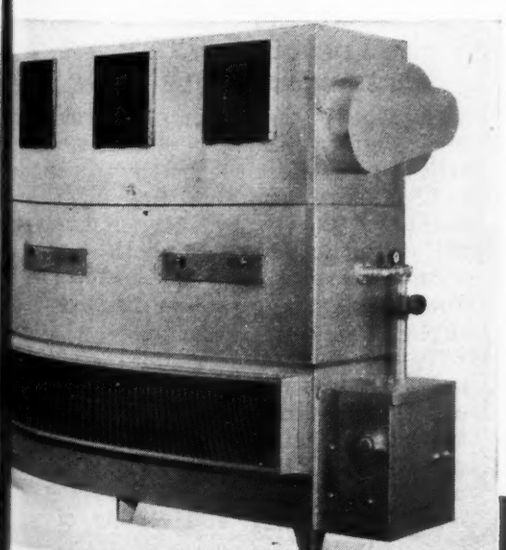
A wide variety of oils such as cottonseed, corn, peanut and sun-



"Buffalo" Type "VPC" Vertical Air Conditioning Cabinets provide practically all air conditioning functions, in desired combinations. **Bulletin 3664.**



"Buffalo" Type "ECC" and "ECS" are compact, attractive cabinets providing efficient, economical cooling of liquids. **Bulletin 3665.**



"Buffalo" Type "EWC" Evaporative Water Coolers are designed for cooling jacket water in compressors, diesels and natural gas engines, other liquids in closed systems.

Three great new "Buffalo" units for Higher Efficiency Better Appearance Easier Servicing

● Result of two years of engineering, the new "Buffalo" Model "F" line gives you a complete range of standardized, sectional units for air conditioning, evaporative condensing and evaporative cooling.

Composed of three basic sections, blower-head, coil section and tank, parts are interchangeable for various types. A new very high-efficiency all-aluminum wheel provides large air volume at very low noise level.

Deliveries on these units are now being scheduled.

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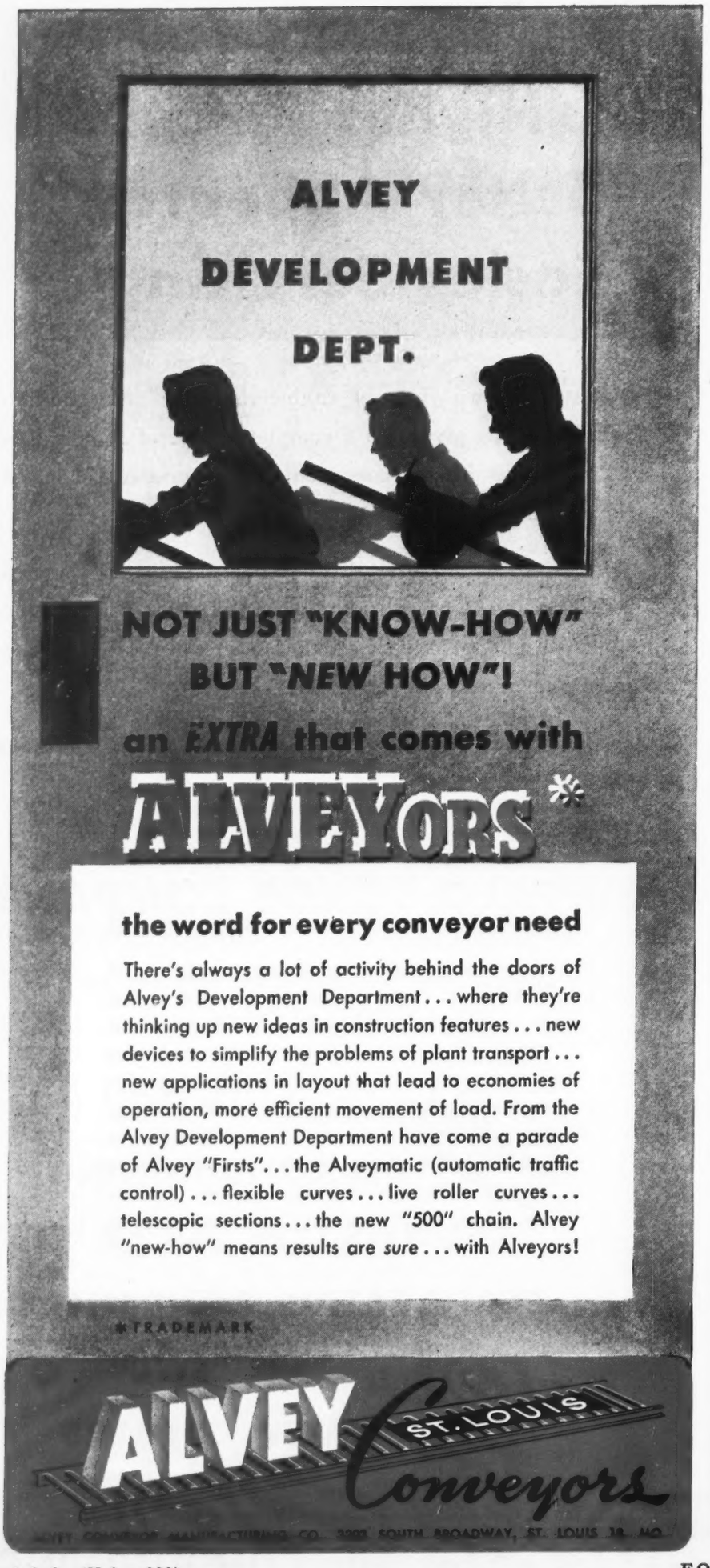
CABINETS TYPE "ECC" & "ECS"

EVAPORATIVE CONDENSORS

TYPE "EWC"

WATER COOLERS

"Buffalo" for AIR CONDITIONING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flower; or semi-solid fats such as lard, butter and margarine, may be used. Hydrogenated soybean, fish, or sperm oil may also be used. The preferred range of fat to milk solids is 30–40 percent fat and 60–70 percent milk solids.

Digest from U. S. Patent 2,431,498, issued Nov. 25, 1947, on an application dated Jan. 14, 1946, to G. C. North, A. J. Alton and Lawrence Little, Chicago, Ill., and assigned to Beatrice Creamery Co.

CEREAL PRODUCTS

Waxy Starch Granules

PREPARING cereal starch for use in dessert products is described in a recently issued patent. By this method, granules of many waxy starches can be made resistant to disintegration on moderate cooking with water. A doughy mass of the waxy starch and water is heated in a thin layer on a hot plate to the pasting temperature of the starch, not allowing the mixture to scorch. The mass is stirred vigorously as it is pasted. When the starch has been largely formed into pellets, it is cooled. The resulting product will withstand the moderate cooking necessary for making tapioca type desserts. The addition of a small amount of corn starch to the waxy starch increases the rate of setting and the firmness of the pudding.

Granules such as these can be made from waxy maize starch, waxy sorghum starch, or other waxy starch which before modification gives a reddish brown color with iodine.

Digest from U. S. Patent 2,431,512, issued November 25, 1947, on an application dated March 31, 1943, to Herman H. Schopmeyer, Hammond, Ind., and assigned to American Maize-Products Co.

DAIRY

Time Factor in HTST Pasteurization of Milk

VARIATION in the amounts of water and milk delivered at the same pump setting may affect the holding time of high-temperature short-time units as much as 26.7 percent. By empirical correction, however, both the volume-delivered and temperature-fluctuation technics appear to have applications to water run tests.

To test methods of timing HTST units, a number of runs were made using the salt test. A small quantity of test fluid was injected into water being pumped through the units. Milliameters were used to indicate beginning and ending of holding period. Timing of travel

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"Without doubt, YARWAY Steam Traps are finest traps ever built. All trap replacements will be YARWAY hereafter."—Oil Company, Texas.

Cleaning Plant

"As soon as we installed the YARWAY trap our trouble ended. Since then, when other traps gave trouble, we put in YARWAYS and they always did a much better job. Now we use all YARWAY traps," says Maintenance Engineer of large mid-western cleaning firm.

Dairy Company

"YARWAY Traps have been a life-saver here. Used many different makes before trying YARWAY a year ago. Haven't touched them since. Trying to get management to buy more."—Large Wisconsin dairy.

Dye Works

Use a good many YARWAY Traps here—like them very much on dryers. Take up little room and discharge condensate as fast as it comes through the line, causing coils to heat up faster and hold steady temperature."—Globe Dye Works, Philadelphia, Pa.

SPEAKING OF STEAM TRAPS

Laundry

"Ironer is so hot it sizzles after putting YARWAY trap on in place of a bucket trap. Run heavy spreads through ironer once and they are dry. Pulling out all bucket traps and will replace with YARWAYS."—Farina Laundry Co., Vancouver, British Columbia.

Power Station

"A great many YARWAY Traps are used here and have been very successful... some of these traps have been in use since 1939 and have given absolutely no trouble."—Herkimer Municipal Power Station, Herkimer, N. Y.

Florist

"Coal bill last winter was $5,000 less than previous winter. Didn't know whether they could give YARWAY Traps all the credit, but they were entitled to a big share of it."—Meyers and Santman (Greenhouses), Wyndmoor, Pa.

Hospital

"Ten years ago replaced an.....trap with a tiny ½" #60 YARWAY on an ironer. Never had such good results before. Trap has never been opened and still going 100%. Since then have bought nothing but YARWAY Traps and will specify them for new addition."—Northern Wisconsin hospital.

ACTUAL SIZE
½" TRAP

Textile Plant

"One large press formerly equipped with a bucket trap wouldn't heat lower platen. A ¾" YARWAY Trap was installed and since then full production has been maintained. This represents an increase of 20% in production."—Southern textile mill.

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ROCCAL is the germicide of tomorrow, ready for your use today.

ROCCAL is amazingly powerful as a germ killer. It inhibits the growth of molds, slimes and algae. Yet ROCCAL is infinitely safer to use than the old-fashioned germicides. In recommended dilutions it is non-poisonous, virtually odorless and tasteless. It is non-corrosive—will not injure metal or fabric. It does not irritate the skin.

ROCCAL is economical . . . is effective in very high dilutions and extremely stable.

In proper dilutions
ROCCAL is:
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was by manually operated stop watches. These runs were compared with the cold injection method, in which small quantities of saturated saline at 30 deg. F. were injected and the time of travel determined by changes in conductance and in temperature indicated by both recording and indicating thermometers. Results showed a mean difference of 1.81 sec. attributable to the slower response of a thermometer.

In applying the test to milk, a series of 3–5 trials are made by injecting cold saline. The difference between the determinations by salt and cold injection technics is used as a correction factor when cold milk is injected during pasteurizing. When holding time is determined by volume delivered, gravimetric determinations are made of the amount of water delivered in a time interval and salt tests are run concurrently. Weight of milk delivered is then determined for a similar time and the holding time estimated by a formula.

Digest from "The Time Factor in High-Temperture Short-Time Pasteurizing," by H. B. Robinson and C. M. Moss, *Journal of Milk and Food Technology*, 44-51, Jan.-Feb., 1948.

Protein in Frozen Milk

INSTABILITY of the protein phase of frozen concentrated milk has been studied on samples of skimmed milk that was forewarmed, concentrated, cooled, standardized, filled into pint containers and frozen statically at about −10 deg. F. After freezing, the milk was stored at either +5 or −10 to −15 deg. F. Samples were withdrawn periodically and reconstituted by thawing with the proper weight of distilled water at 180 deg. F. After the appearance of the thawed samples was observed, they were agitated by pouring 10 times for further testing.

Results of the investigation indicate that freezing alone produces no measurable flocculation of the protein that is not immediately reversible on reconstitution. Reversibility is lessened, however, with time in frozen storage. The floc of frozen milk is calcium caseinate that has been "salted out" by the high concentration of milk salts. Neither freezing nor frozen storage causes any change in titratable acidity, pH or alcohol stability. Flocculation of the casein is accelerated by concentration of the milk and by higher temperatures and longer periods of storage. Additions of calcium acetate and disodium phosphate do not affect the rate of flocculation; sodium citrate decreases it slightly, and the calcium-sequestering polyphosphates defi-

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On the other hand, Powell has spent more than a century making valves—and valves only. So we believe we know more about valves than anyone else—at least anyone outside the valve making industry.

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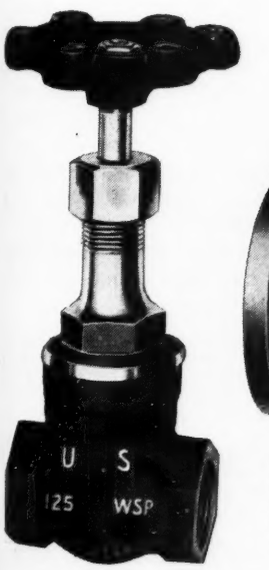

Fig. 500—125-pound Bronze Gate Valve with screwed ends, screwed-in bonnet, inside screw rising stem and tapered solid wedge in sizes ¼" to ¾", inclusive; double wedge in sizes 1" to 3", inclusive.

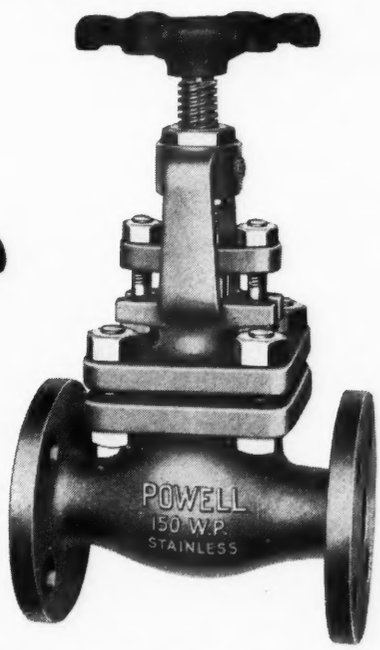

Fig. 1969—150-pound Stainless Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and tapered solid wedge.

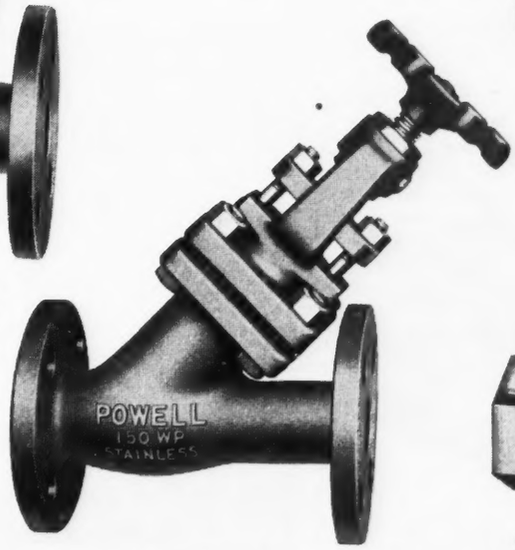

Fig. 2051—150-pound Stainless Steel "Y" Valve. Has flanged ends, bolted flanged yoke, outside screw rising stem and plug type disc.

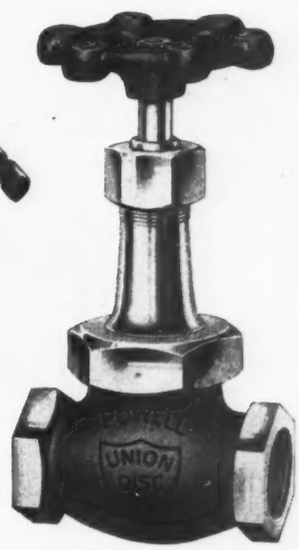

Fig. 150—150-pound Bronze Globe Valve with screwed ends, union bonnet and renewable composition disc.

The Wm. Powell Co., Cincinnati 22, Ohio

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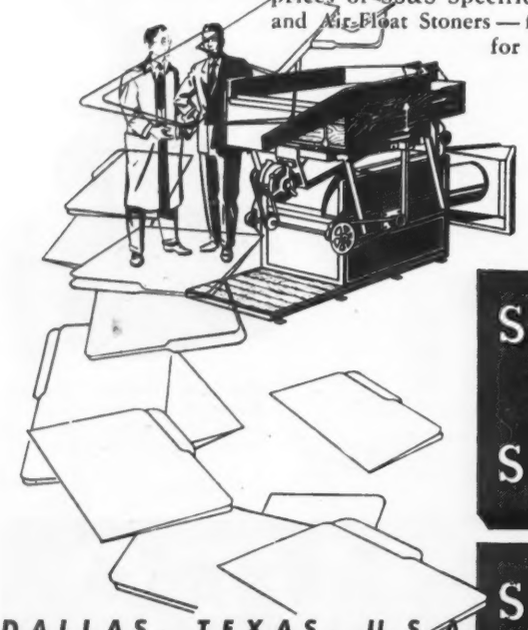

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nitely retard it but cause an astringent flavor. Rate of casein flocculation is not significantly altered by raising or lowering the pH of the milk prior to frozen storage; but the reversibility with heat is greatly decreased when the milk is acidified and slightly increased when alkalized, which suggests the importance of avoiding bacterial action in milk to be frozen and stored.

Digest from "Observations on the Instability of the Protein Phase of Frozen Concentrated Milk," by F. J. Doan and F. G. Warren, *Journal of Dairy Science*, vol. 30, 837-848, November, 1947.

QUALITY CONTROL

Pectin Analysis

ESTIMATION of pectin in analysis of food products may be done by two general methods: By the precipitation of pectin as calcium pectate or by volumetric methods of titration of dilute alkali in the presence of an indicator, the addition of an excess of acid, followed by back titration. Quantitatively, this gives the weight of pectin.

In pectin analysis of jams, the volumetric method cannot be used, because the jam solutions are too difficult to filter. Experiments using the precipitation method with calcium chloride show that saponification is practically instantaneous. Contrary to the usual practice which recommends hydrolysis reaction time of at least seven hours, these experiments indicate that shortening the time avoids the possibility of decomposition of the pectin.

Digest from "Methods for the Estimation of Pectin", by A. R. Deschreider and Simone Van Den Driesche, *Food Manufacture*, 77-83, February, 1948

FREEZING

Bacteria in Frozen Foods

PRESENCE and numbers of bacteria in frozen foods are indicative of probable shelf life as well as of the handling methods prior to freezing. Plate counts of good quality frozen vegetables run from 1,000 to a few hundred thousand per g., with most samples showing less than 100,000. Peas and corn had the highest counts and, surprisingly enough, two lots of good quality peas had counts of 100,000 to 420,000, while two lots of poor quality had only 3,000 to 25,000 per g.

Laboratory trials on freezing and blanching peas showed that low counts are possible if the peas are frozen promptly, but that counts

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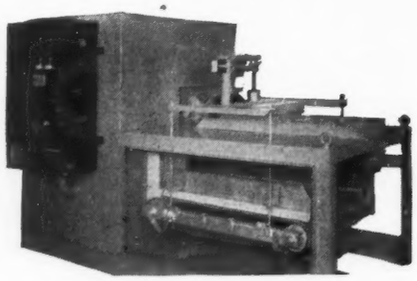

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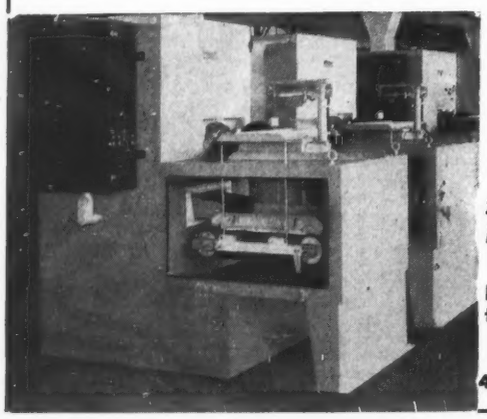

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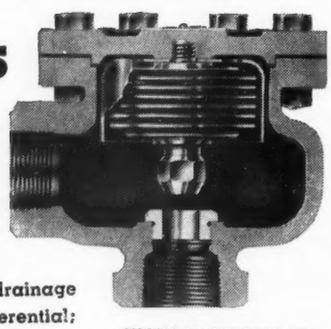

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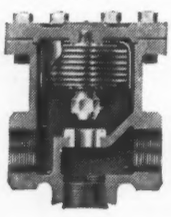

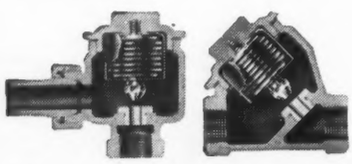

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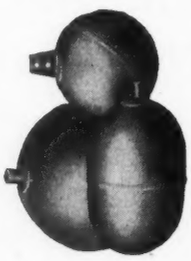

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rise rapidly at room temperature. In commercial processing, packing line equipment readily becomes contaminated with juices from bruised vegetables and bacteria develop rapidly. Scrapings from an elevator, rubber rollers and knives on a string bean processing line were found to contain millions of bacteria per g. These organisms had passed the lag phase and were actively growing. When transferred to vegetables passing over the line they continue to grow at the logarithmic rate. If vegetables are not frozen promptly after the prefreezing processing, bacteria counts may be high. Such counts are not necessarily an indication of quality of the food, but of the handling of it between blanching and freezing.

Digest from "Significance of Bacteria in Frozen Vegetables," by C. S. Pederson, *Food Research*, vol. 12, 429-38, Nov.-Dec., 1947.

MISCELLANEOUS

Blanching Vegetables

BLANCHING and cooling of fruits and vegetables during preparation for freezing can result in large losses of soluble solids. Water blanching causes larger losses than steam blanching.

Spinach, blanched for 90 sec. in steam and air cooled, lost 9.5 percent of soluble solid (referred to insoluble solids), while a 60-sec. water blanch at 212 deg. F. followed by aircooling resulted in a 28.5 percent loss. Water cooling leads to further losses. Steam - blanched spinach cooled in water for 2, 3 and 4 min. periods lost 20.9, 21.9 and 25.7 percent, respectively. Water blanching and water cooling (running water for 2–4 min.) resulted in a 31.4 percent loss.

Asparagus suffers large losses from blanching and cooling in water —up to 47.7 percent in one sample blanched 3½ min. in steam and cooled 3 min. in running water. Cooking and discarding the cooking water can result in a loss of nearly half the soluble solids. Broccoli, dried carrots and sliced apples showed similar losses.

It is possible to cool blanched fruits and vegetables in a moving stream of air at rates not significently different from these obtained by water sprays. Still air is inadequate. Even air at relatively high dry bulb temperature (77–135 deg F.) cools more rapidly than still air.

Digest from "Cooling of Blanched Vegetables and Fruits for Freezing," by L. A. Hohl, J. Swanburg, J. David and R. Ramsey, *Food Research*, vol. 12, 484-95, Nov.-Dec., 1947.

BOOKS

Pest Directory

ENDOMA: A DIRECTORY OF INSECT AND PLANT PEST CONTROL. 7th Ed. Edited by G. S. Langford. Published by Eastern Branch of the American Association of Economic Entomologists; Dept. of Entomology, University of Maryland, College Park, Md. 416 pages; 6 x 9 in.; paper. Price, $1

Compiled by a committee of authorities in the pest-control field, this volume is both a handbook and a directory. As a handbook it has particular value to sanitarians and others in food processing and storage companies who are concerned with the problems of fungi and insect control. As a directory it contains a large listing of insecticides, fungicides and grain and seed disinfectants. There is also a listing of accessory materials and equipment supplied by all principal manufacturers and distributors of pest control products. Very little attention is given to rodenticides and rodent control. A listing of trade-marked insecticides, fungicides and adjuncts is included.

Those desiring consultative or analytical services on fungi and insect control will find listings of entomological services, related federal and state bureaus and boards, and directories of associations, societies and supplies dealers in the U. S. and Canada. Others, who have only occasional use for pest control information, will find fundamental facts about insecticides and fungicidal materials along with recommendations for their selection and use.

Food Chemistry

CHEMICAL ANALYSIS OF FOODS. Third Edition. By Henry Edward Cox. Published by the Sherwood Press, Box 552, Edgewater Branch, Cleveland 7, Ohio, 1947. 317 pages; 5½ x 8¾ in.; cloth. Price, $8.

Food analysts will find here most of the thoroughly tested methods used in determining the chemistry of foods. This edition follows editions published in 1926 and 1948 by the same author, who is one of England's Public Analysts and a consulting chemist of London.

With the many developments of the past eight years to choose from, a great deal has been added in this edition. Included in the new material are the determination of metallic impurities, of total solids in milk, available carbon dioxide in baking powders, oxidation and other values in vinegar, and soya meal and rancidity tests. Tables and illustrations help to clarify much of the material.

Dairy Processes

MILK AND DAIRY PRODUCTS. By Lincoln M. Lampert. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y., 1947. 291 pages; 8¾x5¾ in.; cloth. Price, $7

This is a nontechnical treatment of the chemistry, bacteriology and nutrition value of milk and milk products. It gives concise descriptions of the various methods used to process milk and to manufacture the products. It also offers valuable data on human milk, goat's milk and oleomargarine.

The author's aim has been to present a book that would be of value to the modern dairy plant operator and his employees, as well as to milk sanitarians and dietitians. For the reader who may want to go further, a list of recommended publications is given in the appendix. Recent publications in dairy science are also highlighted through the literature references in the text.

Stream Polution

MANUAL ON STREAM POLLUTION FOR PLANT MANAGEMENT. Published by Manufacturing Chemists' Association, 600 Woodward Bldg., Washington 5, D. C. Price, 20 cents.

As part of its long-range program to aid industry in combating pollution of streams, the Manufacturing Chemists' Association has published a manual that should be of interest to management and technical staffs of food processing plants, which discharge wastes into streams.

The manual, which is being distributed to 200 manufacturers, recommends that waste disposal be brought into the laboratory and made a part of the research that develops or improves products. It sets up guides for construction or enlargement of plant facilities, and spells out conditions that should be met by plant management to carry out a minimum attack on the problem of stream pollution.

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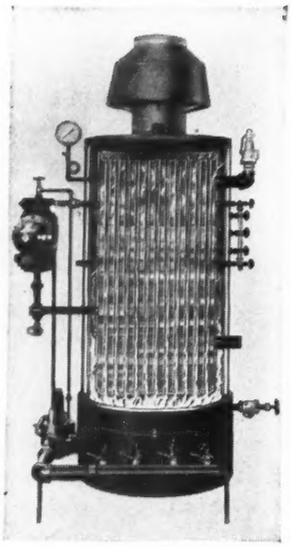

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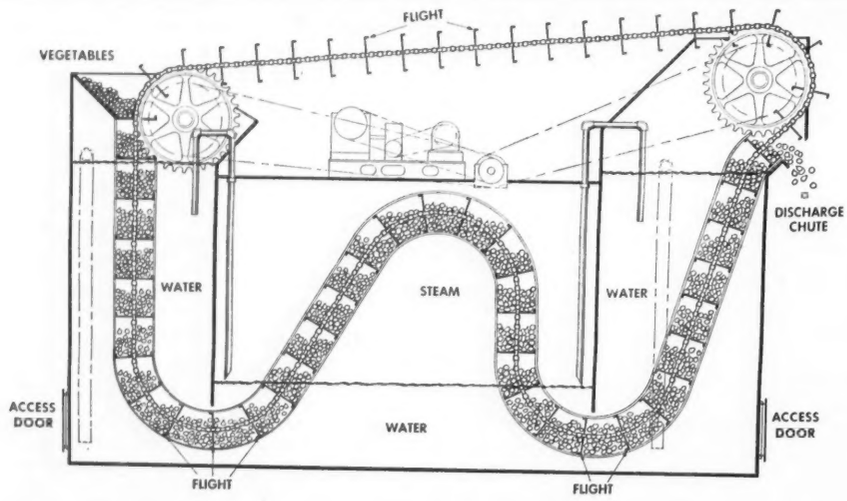

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GOVERNMENT PUBLICATIONS

The following recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the Bureau responsible for its issue.

MANUAL OF RECOMMENDED WATER-SANITATION PRACTICE. U. S. Public Health Bulletin No. 296. Price 15 cents. Includes precautions on planning, management, and scientific control.

MARKETING MARGINS AND COSTS FOR DAIRY PRODUCTS. By Charles B. Howe. U S Department of Agriculture, Technical Bulletin No 936. Price 20 cents. A statistical and economic interpretation of a field study covering the United States.

RAT PROOFING. Prevention of waste of farm materials by destruction or contamination by rats has led to the preparation of several new rat-control and rat-proofing documents, available for industrial use on application to Fish and Wildlife Service, Washington 25, D. C

COSTS OF CANNING SELECTED VEGETABLES, NORTHEASTERN STATES, 1941. By R W Hoecker and Hugh L. Cook. Bureau of Agricultural Economics. Mimeographed Detailed statistical summary of field survey released only this winter

MILK PRODUCTION ON FARMS AND STATISTICS OF DAIRY PLANT PRODUCTS, 1947. Bureau of Agricultural Economics. Mimeographed Gives data by States and by months for major commodity activities.

ANNUAL REPORT OF THE COMMISSIONER OF INTERNAL REVENUE FOR THE FISCAL YEAR ENDED JUNE 30, 1947 Price 40 cents. Includes customary statistics for alcohol and products made with alcohol.

POTATO STORAGE. By Alfred D. Edgar. U. S. Department of Agriculture, Farmers' Bulletin No 1986. Price 10 cents. Describes buildings, equipment and methods of handling.

APPLE SCALD AND ITS CONTROL. By D. F. Fisher and J. S. Cooley. U. S. Department of Agriculture, Farmers' Bulletin No. 1380. Issued 1923, revised October 1947 Price 5 cents. Practical instructions for warehousemen and processors.

PROPOSED TRADE PRACTICE RULES FOR WHOLESALE CONFECTIONERY INDUSTRY. Federal Trade Commission. February 5, 1948. Processed. Mainly merchandising regulations.

PROCEDURE AND CRITERIA WITH RESPECT TO THE ADMINISTRATION OF THE "ESCAPE CLAUSE" IN TRADE AGREEMENTS. U. S. Tariff Commission. Processed. A statement on policy prepared in response to a resolution of the Committee on Ways and Means of the House of Representatives.

PATENTS

Baking Oven Equipped with Self-Contained Portable Loading Unit—Wm. L. Mueller, LaGrange, and C. R. Skarin, Western Springs, Ill., to Peterson Oven Company. No. 2,436,052. Feb. 17, 1948.

Dry, Chemically Stable Mixture Made to Contain 2.6 to 3.1 Parts Pectic Acid to One Part Sodium Bicarbonate and Capable of Liberating CO_2 upon Addition of Cold Water—W. E. Baier, Ontario, Calif., to California Fruit Growers Exchange, Los Angeles, Calif. No. 2,436,086. Feb. 16, 1942.

Fiberboard Milk Container Divided into Two Compartments to Permit Separation of Cream—C. E. Deardorff, Sacramento, Calif., to C. E. Deardorff, Inc. No. 2,436,140. Feb. 17, 1948.

Poultry Mechanically Plucked During Rotation of Spaced Disks Fitted with Series of Elastic Bars—G. W. Johnson, Raytown, Mo., to Gordon Johnson Co., Kansas City, Mo. No. 2,436,214. Feb. 17, 1948.

Fruit Juices Concentrated by Freezing—W. E. Malcolm, Orlando, Fla. No. 2,436,218. Feb. 17, 1948.

Casein Given Adhesive Properties by Heating in Water to About 145 Deg. F. in Presence of Alkali Preliminary to Treatment with Proteolytic Enzyme and Subsequent Heating to Render Enzyme Inactive—S. M. Weisberg and E. G. Stimson, Baltimore, Md., to National Dairy Research Laboratories, New York. No. 2,436,239. Feb. 17, 1948.

Pitted Olives Brine Pickled with Onions Preparatory to Stuffing with Flavorless, Flavor-Absorbing Melon Flesh—E. Van Deilen and R. N. Ball, Visalia, Calif. No. 2,436,163. Feb. 24, 1948.

Toasted Flaked Breakfast Cereal Made to Consist of Soya Flour and Cereal Grain Particles—C. E. Luke, Irwin, Pa., to General Foods Corp., New York. No. 2,436,519. Feb. 24, 1948.

Individual Bottles of Milk Pasteurized by Portable Unit—E. F. Mangold, London, Ohio, one half to H. P. Chapman, Columbus, Ohio. No. 2,436,585. Feb. 24, 1948.

Jaws Pulled from Head of Slaughtered Hog by Mechanical Means—J. A. Carlsen, Omaha, Nebr., to People of United States. No. 2,436,629. Feb. 24, 1948.

Grain Discharged Through Multiple Valve Unit—A. Volk, Milwaukee, Wis., to Schenley Distillers Corp., New York. No. 2,436,624. Feb. 24, 1948.

D-Glucose Added to Nitric Acid at Temperature Between 55 and 90 Deg. C. in Absence of Metallic Oxidation Catalysts to Make D-Saccharic Acid—C. L. Mehltretter, Peoria, Ill., to United States of America. No. 2,436,659. Feb. 24, 1948.

Dry Powdered Soup Base Made to Consist Essentially of Monosodium Glutamate and Thickening Agent—G. J. Esselen, Swampscott, Mass. Reissue No. 22,978, March 2, 1948.

Sugars Polymerized by Melting and Heating under Substantially Anhydrous Conditions in Contact with Superheated Steam—G. J. Leuck, Brooklyn, to Corn Products Refining Co., New York. No. 2,436,967. March 2, 1948.

Cereal Starch Separated from Unsteeped Grain by Mechanical Treatment in Colloidizing Units—H. K. Murer, Summit and W. A. Mitchell, Cedar Grove, N. J., to General Foods Corp., New York. No. 2,437,036. March 2, 1948.

Animal and Vegetable Oils Refined by Centrifugal Separation of Aqueous Foods in Presence of Softening Agent such as Abietic Acid, Naphthenic Acid, or Their Water Soluble Soaps—B. Clayton, Houston, Tex., to Benjamin Clayton doing Business as Refining Unincorporated. No. 2,437,075. March 2, 1948.

Milk and Milk Whey Fractionated by Continuous Osmotic Diffusion and Gravity Stratification Dialysis—F. K. Daniel, Kew Gardens, N. Y., to Sun Chemical Corp., New York. No. 2,437,080. March 2, 1948.

Fish Dressed by Mechanical Means—P. Danielsson, Stora Essingen, Sweden, to Arenco Aktiebolag, Stockholm, Sweden. No. 2,437,081. March 2, 1948.

Dry, Non-Hydroscopic, Water-Soluble Fruit Juice Concentrate made to Contain Calcium Phytate—R. Lee to Lee Foundation for Nutritional Research, Milwaukee, Wis. No. 2,437,104. March 2, 1948.

Bread Sliced on Machine Equipped with Multiple Cutting Blades—C. H. Petskeyes, Davenport, Ia., to Gelimann Manufacturing Co. Rock Island, Ill. Nos. 2,437,122; 2,437,123 and 2,437,124. March 2, 1948.

Cereal Food Mixture Compressed into Individual Service Units Sufficiently Firm to Withstand Wrapping and Packing and Sufficiently Pliable to be Easily Crumbled using Glycerine or Propylene Glycol as Binder—I. A. Berg, Cincinnati, Ohio. No. 2,437,150. March 2, 1948.

Green Peas in Pod Subjected to 2,000 Deg. F. Temperature Preliminary to Chilling and Shelling.—M. E. Dunkley, Modesto, Calif. No. 2,437,155. March 2, 1948.

Ravioli Made in Continuous Mechanical Manner—S. Marino, Chicago, Ill. No. 2,437,202. March 2, 1948.

Dry and Liquid Materials Mechanically Mixed and Filled into Open-Mouthed Containers in Continuous Manner and under Pressure—J. P. Wilson, Ardmore, H. T. Lewis, Jr., Philadelphia and D. C. Glassford, Merion Station, Pa., to Proctor & Schwartz, Inc. No. 2,437,216. March 2, 1948.

Coconut Oil and Related Animal and Vegetable Oils and Fats Heat-Treated in Presence of Lime Soap to make Gasoline—S. Petroff and A. E. Prats, Manila, P. I. No. 2,437,438. March 9, 1948.

Beer Delivered in and Dispensed from Truck Tanks—L. Schottgen, Penwell, N. J., and M. J. Parkerton, New York. No. 2,437,618. March 9, 1948.

Fruit, such as Apples, Sliced and Cored in Self Contained Machine—E. W. Bridge, Philadelphia, Pa. No. 2,437,637. March 9, 1948.

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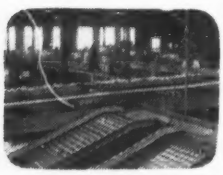

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Letters to the Editor

Synthetic Flavoring In Frozen Cakes

To the Editor
of FOOD INDUSTRIES

In the March, 1947, issue of FOOD INDUSTRIES, page 106, was a paper entitled, "How Storage Affects Frozen Cakes and Batters." This paper condemned the use of imitation vanilla extract as flavoring for frozen doughs, but failed to give the composition of the vanilla extract used in the experimental work. The assumption was that the extract contained vanillin and that vanillin was the cause of flavor spoilage in frozen doughs held in storage for various periods of time.

On the evidence presented in this paper, the conclusion is unwarranted. There are ingredients other than vanillin used in many imitation vanilla flavorings commercially available. The solvent used in the vanilla extract might also influence flavor changes as well as other flavor ingredients such as coumarin, heliotropin, or other bouqueting agents.

Moreover, if this vanilla flavoring is desirable, a change in the basic cake ingredients might be effective in preventing flavor spoilage.

Controlled experiments using flavor ingredients of known composition are required to properly substantiate the observations made in this paper.—*E. H. Hamann, Flavor Research Laboratory, Fritzsche Brothers, Inc.*

Comments By Author

The aim of the research reported was not to study the synthetic vanilla in frozen cakes and batters. The discoveries made regarding the flavoring were highly incidental and not an integral part of the study at all. The more detailed report of this work, "The Freezing and Storage at —10 deg. F. of Plain Cake and Cake Batter Made From Two Fats" on file in the Iowa State College Library, Ames, Iowa, shows that the other possibilities suggested by Mr. Hamann as possible agents of flavor change were considered.

In the report printed in FOOD INDUSTRIES there is no condemnation of imitation vanilla extract *per se*—at least none was intended! (See the phrase "*may* cause" in the first paragraph.)

Obviously, since the purpose of the research was not to study the effects of the use of imitation vanilla flavoring, and since space in such a condensed report is limited, going further into the ramifications of this particular observation was beyond the scope of the study.

The results under discussion were included merely for whatever intrinsic worth they might have and to stimulate the interest of anyone who might wish to make a further and more thorough study of this manifestation. All that Mr. Hamann says about the need for further controlled experiments is perfectly true.

—*Lora Stone (Graul).*

Fly Control

(*Continued from page* 116)

Attitude of Authorities

Flies are killed by the absorption of the insecticide into their nervous systems. The absorption can result from contact with the minute particles of vapor in the air or with the residue adhering to the surface of the enclosed space. This residual effect of DDT is quite important in maintaining continuous protection from flies. Special attention, however, should be given to laws governing the residual limits of DDT. The equipment complies with the regulations of the New York City Health Department which allow the use of a 2 percent space spray and a 5 percent residual spray in food establishments.

If used as recommended, in 20,000 cu. ft. of space, there is very little danger from the toxicity of DDT, according to an opinion from the Industrial Hygiene Research Laboratory of the U. S. Public Health Service.

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